Nokia Customer Care

Service Manual

RM-49 (Nokia E60)

Mobile Terminal

Part No: 9246590 (Issue 1)

COMPANY CONFIDENTIAL

NOKIA

Amendment Record Sheet

Amendment No	Date	Inserted By	Comments
Issue 1	03/2006	TSa	

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IMPORTANT

This document is intended for use by qualified service personnel only.

Warnings and cautions

Warnings

- IF THE DEVICE CAN BE INSTALLED IN A VEHICLE, CARE MUST BE TAKEN ON INSTALLATION IN VEHICLES FITTED WITH ELECTRONIC ENGINE MANAGEMENT SYSTEMS AND ANTI-SKID BRAKING SYSTEMS. UNDER CERTAIN FAULT CONDITIONS, EMITTED RF ENERGY CAN AFFECT THEIR OPERATION. IF NECESSARY, CONSULT THE VEHICLE DEALER/ MANUFACTURER TO DETERMINE THE IMMUNITY OF VEHICLE ELECTRONIC SYSTEMS TO RF ENERGY.
- THE PRODUCT MUST NOT BE OPERATED IN AREAS LIKELY TO CONTAIN POTENTIALLY EXPLOSIVE ATMOSPHERES, FOR EXAMPLE, PETROL STATIONS (SERVICE STATIONS), BLASTING AREAS ETC.
- OPERATION OF ANY RADIO TRANSMITTING EQUIPMENT, INCLUDING CELLULAR TELEPHONES, MAY INTERFERE WITH THE FUNCTIONALITY OF INADEQUATELY PROTECTED MEDICAL DEVICES. CONSULT A PHYSICIAN OR THE MANUFACTURER OF THE MEDICAL DEVICE IF YOU HAVE ANY QUESTIONS. OTHER ELECTRONIC EQUIPMENT MAY ALSO BE SUBJECT TO INTERFERENCE.
- BEFORE MAKING ANY TEST CONNECTIONS, MAKE SURE YOU HAVE SWITCHED OFF ALL EQUIPMENT.

Cautions

- Servicing and alignment must be undertaken by qualified personnel only.
- Ensure all work is carried out at an anti-static workstation and that an anti-static wrist strap is worn.
- Ensure solder, wire, or foreign matter does not enter the telephone as damage may result.
- Use only approved components as specified in the parts list.
- Ensure all components, modules, screws and insulators are correctly re-fitted after servicing and alignment.
- Ensure all cables and wires are repositioned correctly.
- Never test a mobile phone WCDMA transmitter with full Tx power, if there is no possibility to perform the measurements in a good performance RF-shielded room. Even low power WCDMA transmitters may disturb nearby WCDMA networks and cause problems to 3G cellular phone communication in a wide area.
- During testing never activate the GSM or WCDMA transmitter without a proper antenna load, otherwise GSM or WCDMA PA may be damaged.

ESD protection

Nokia requires that service points have sufficient ESD protection (against static electricity) when servicing the phone.

Any product of which the covers are removed must be handled with ESD protection. The SIM card can be replaced without ESD protection if the product is otherwise ready for use.

To replace the covers ESD protection must be applied.

All electronic parts of the product are susceptible to ESD. Resistors, too, can be damaged by static electricity discharge.

All ESD sensitive parts must be packed in metallized protective bags during shipping and handling outside any ESD Protected Area (EPA).

Every repair action involving opening the product or handling the product components must be done under ESD protection.

ESD protected spare part packages MUST NOT be opened/closed out of an ESD Protected Area.

For more information and local requirements about ESD protection and ESD Protected Area, contact your local Nokia After Market Services representative.

Care and maintenance

This product is of superior design and craftsmanship and should be treated with care. The suggestions below will help you to fulfil any warranty obligations and to enjoy this product for many years.

- Keep the phone and all its parts and accessories out of the reach of small children.
- Keep the phone dry. Precipitation, humidity and all types of liquids or moisture can contain minerals that will corrode electronic circuits.
- Do not use or store the phone in dusty, dirty areas. Its moving parts can be damaged.
- Do not store the phone in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.
- Do not store the phone in cold areas. When it warms up (to its normal temperature), moisture can form inside, which may damage electronic circuit boards.
- Do not drop, knock or shake the phone. Rough handling can break internal circuit boards.
- Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the phone.
- Do not paint the phone. Paint can clog the moving parts and prevent proper operation.
- Use only the supplied or an approved replacement antenna. Unauthorised antennas, modifications or attachments could damage the phone and may violate regulations governing radio devices.

All of the above suggestions apply equally to the product, battery, charger or any accessory.

Company Policy

Our policy is of continuous development; details of all technical modifications will be included with service bulletins.

While every endeavour has been made to ensure the accuracy of this document, some errors may exist. If any errors are found by the reader, NOKIA MOBILE PHONES Business Group should be notified in writing/e-mail.

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- Page(s) and/or Figure(s) in error

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Battery information

Note: A new battery's full performance is achieved only after two or three complete charge and discharge cycles!

The battery can be charged and discharged hundreds of times but it will eventually wear out. When the operating time (talk-time and standby time) is noticeably shorter than normal, it is time to buy a new battery.

Use only batteries approved by the phone manufacturer and recharge the battery only with the chargers approved by the manufacturer. Unplug the charger when not in use. Do not leave the battery connected to a charger for longer than a week, since overcharging may shorten its lifetime. If left unused a fully charged battery will discharge itself over time.

Temperature extremes can affect the ability of your battery to charge.

For good operation times with Ni-Cd/NiMh batteries, discharge the battery from time to time by leaving the product switched on until it turns itself off (or by using the battery discharge facility of any approved accessory available for the product). Do not attempt to discharge the battery by any other means.

Use the battery only for its intended purpose.

Never use any charger or battery which is damaged.

Do not short-circuit the battery. Accidental short-circuiting can occur when a metallic object (coin, clip or pen) causes direct connection of the + and - terminals of the battery (metal strips on the battery) for example when you carry a spare battery in your pocket or purse. Short-circuiting the terminals may damage the battery or the connecting object.

Leaving the battery in hot or cold places, such as in a closed car in summer or winter conditions, will reduce the capacity and lifetime of the battery. Always try to keep the battery between 15°C and 25°C (59°F and 77°F). A phone with a hot or cold battery may temporarily not work, even when the battery is fully charged. Batteries' performance is particularly limited in temperatures well below freezing.

Do not dispose of batteries in a fire!

Dispose of batteries according to local regulations (e.g. recycling). Do not dispose as household waste.

Nokia E60 Service Manual Structure

1 General Information
2 Parts Lists and Component Layouts
3 Service Software Instructions
4 Service Tools and Service Concepts
5 Disassembly/Reassembly Instructions
6 BB Troubleshooting and Manual Tuning Guide
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1 — General Information

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RM-49 product selection

Nokia RM-49 is a WCDMA/GSM dual mode handportable phone, supporting WCDMA 2100 (UMTS) and EGSM 900/1800/1900 bands.

According to GSM standard 05.05 it responds to class 4 (max. 2W) in EGSM 900, class 1 (1W) in GSM 1800 and class 1 in GSM 1900. RM-49 supports EGPRS (EDGE) class B as well as Bluetooth 1.2 standard. The handset has a full phase 2 Type Approval and it complies with the GSM Type Approval. RM-49 also has a full CE approval and FCC approval.

The MMS implementation follows the OMA MMS standard release 1.2.

WAP 2.0 compatible browser supports XHTML Mobile Profile (MP) and uses a TCP/IP stack to communicate with a gateway in network.

RM-49 uses Symbian 9.1 operating system and supports also MIDP Java 2.0 & CLDC1.1, providing a good platform for 3rd party applications.

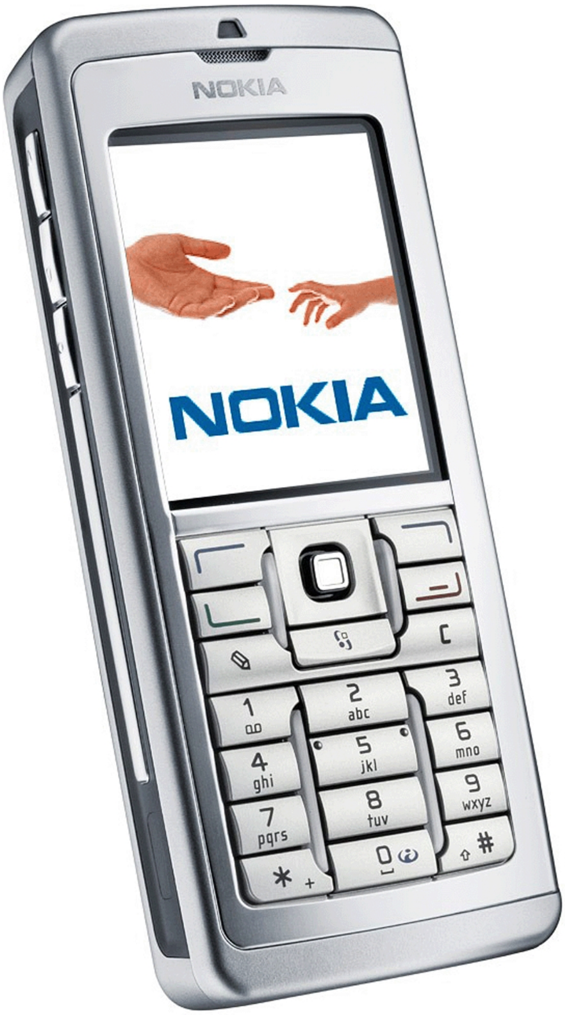

Figure 1 View of RM-49

RM-49 product features and sales package

Hardware characteristics

- Supports up to 16M colors within 352 x 416 pixels.
- 5-way joystick, power key used as profile key, 1+1 user specifiable soft key.s

- Volume keys and voice key combining voice recording, voice dialing and Push to talk (PoC) functionality.
- 75 MB user memory.
- Supports RS-MMC (hot swap).
- WCDMA (3GPP Release 4) & triple band EGSM 900/1800/1900.
- WCDMA PS max speed UL/DL 128/384 kbps. WCDMA CSD up to 57.6 kbps UL& Transparent 64 kbps for Video Telephony application.
- GPRS/EGPRS (Class B, MSC 10), GSM CSD up to 14.4 and 43.2 (HSCSD) kbps. CSD up to 57.6 kbps in WCDMA networks.
- Integrated Handsfree.
- Internal vibra.

Software platform

- SW platform: Nokia Series 60 3rd Edition

Connectivity

- Integrated WLAN (IEEE 802.11g, 802.11e, 802.11i)
- USB 2.0 full-speed
- Bluetooth 1.2
- Pop-Port™ connector with ACI
- IrDA (115 kbps)

Productivity

- SMS, MMS and email
- MS Word, PowerPoint , Excel and Adobe Reader, ZIP manager
- PIM (Calendar & Contacts)
- Internet browser
- Push to talk
- Logs (last calls , timers and history list)
- Instant messaging
- Java™ MIDP 2.0, CLDC 1.1, PIM API, File access API
- MP3/AAC
- Data Transfer
- Settings Wizard/Access Point Configurator

Sales package

- Transceiver RM-49
- BL-5C Li-ion Battery Cell
- ACP-12 Charger
- All-in-one User Guide (warranty card + accessory info + getting started sheet + invitational module for Club Nokia)
- CD-ROM
- Stereo Headset HDS-3
- USB Cable CA-53

- RS-MMC 64 MB with adapter
- Add-on application guide

Product and module list

Module name	Type code	Notes
System/RF Module	1JQ	Main PWB with components
Display Module		
Chassis Assy		Mechanical Assembly
UI Frame Assy		Mechanical Assembly
SW Module		

Mobile enhancements

Audio	
Fashion Stereo Headset	HS-3
Headset	HS-5
Boom Headset	HDB-4
Stereo Headset	HDS-3
Classic Stereo Headset	HS-23
Stereo Music Headset	HS-20
Fashion Stereo Headset	HS-31
Activity Headset	HS-8
FM Radio Headset	HS-2R
FM Radio Headset	HS-27R
Wireless Boom Headset	HS-4W
Wireless Clip-on Headset	HS-21W
Wireless Headset	HS-11W
Wireless Headset	HS-36W
Wireless Headset	HS-37W
Wireless Headset	HS-26W
Audio Adapter	AD-15
Inductive Loopset	LPS-4
Music Stand	MD-1
TTY Adapter	HDA-10

Car	
Headrest Handsfree	BHF-3

Car	
Wireless Car Kit	CK-1W
Plug-in Car Handsfree	HF-3
Car Kit	N616
Privacy Handset for N610, N616	HSU-4
Advanced Car Kit	CK-7W
Wireless Plug-in Car Handsfree	HF-6W
Mobile Holder	CR-26
Universal Mobile Holder	CR-39
Car Kit	CK-10

Carrying	
Carrying Case	CP-60
Carrying Case	CP-50
Carrying Case	CP-59
Carrying Case	CP-68
Carrying Case	CP-69

Data	
Connectivity Cable	DKU-2
Connectivity Cable	CA-53
64 MB MultiMediaCard (MMC)	MU-1
128 MB MultiMediaCard (MMC)	MU-2
256 MB MMCmobile Card	MU-9
512 MB MMCmobile Card	MU-12
1 GB MMCmobile Card	MU-13

Imaging	
Nokia Remote Camera	PT-6

Messaging	
Wireless Keyboard	SU-8W
Digital Pen	SU-1B
Wireless GPS Module	LD-1W

Power	
Li-Ion Battery	BL-5C
Retractable charger	AC-1
Travel Charger	ACP-12
Charger	ACP-7
Mobile Charger	LCH-12

Technical specifications

Transceiver general specifications

Unit	Dimensions (L x W x T)	Weight (g)	Volume (cm^3)
Transceiver with BL-5C 970mAh li-ion battery back	115X49X16.9mm	117 (including BL-5C battery)	96

Main RF characteristics for triple-band (EGSM900/GSM1800/GSM1900) and WCDMA phones

Parameter	Unit
Cellular system	EGSM900, GSM1800/1900 and WCDMA
Rx frequency band	EGSM900: 925 - 960 MHz
	GSM1800: 1805 - 1880 MHz
	GSM1900: 1930 - 1990 MHz
	WCDMA: 2110 - 2170 MHz
Tx frequency band	EGSM900: 880 - 915 MHz
	GSM1800: 1710 - 1785 MHz
	GSM1900: 1850 - 1910 MHz
	WCDMA: 1920 - 1980 MHz
Output power	GSM900: +5 ... +33dBm/3.2mW ... 2W
	GSM1800: +0 ... +30dBm/1.0mW ... 1W
	GSM1900: +0 ... +30dBm/1.0mW ... 1W
	WCDMA -50 ... 24 dBm
Number of RF channels	GSM900: 125
	GSM1800: 375
	GSM1900: 300
	WCDMA: 277
Channel spacing	200 kHz

Parameter	Unit
Number of Tx power levels	GSM900: 15
	GSM1800: 16
	GSM1900: 16

Battery endurance

Battery	Capacity (mAh)	Talk time	Stand-by
BL-5C	970	2-3 hrs (WCDMA) and 3-6 hrs (GSM)	8 days

Charging times

ACP-12	LCH-12
2h	2h

Environmental conditions

Environmental condition	Ambient temperature	Notes
Normal operation	-5ºC...+55ºC	
Reduced performance	-30ºC...-15ºC +55ºC...+70ºC	
Intermittent operation	-40ºC...-30ºC +70ºC...+85 ºC	Product recovers from storage and transportation
No operation or storage	<-40ºC...>+85ºC	No storage or operation: an attempt may damage the phone.
Long term storage conditions	0ºC...+85ºC	

2 — Parts Lists and Component Layouts

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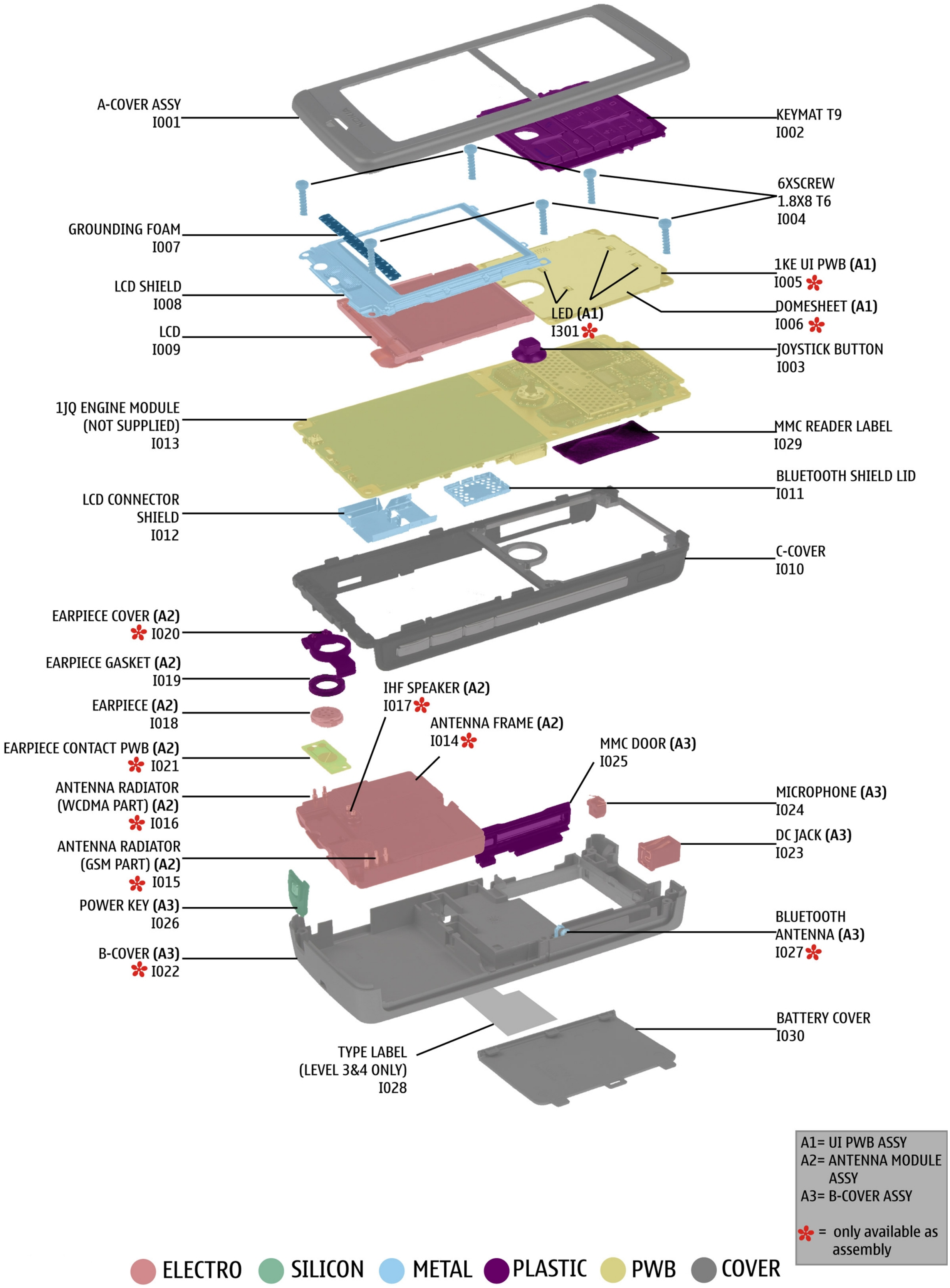
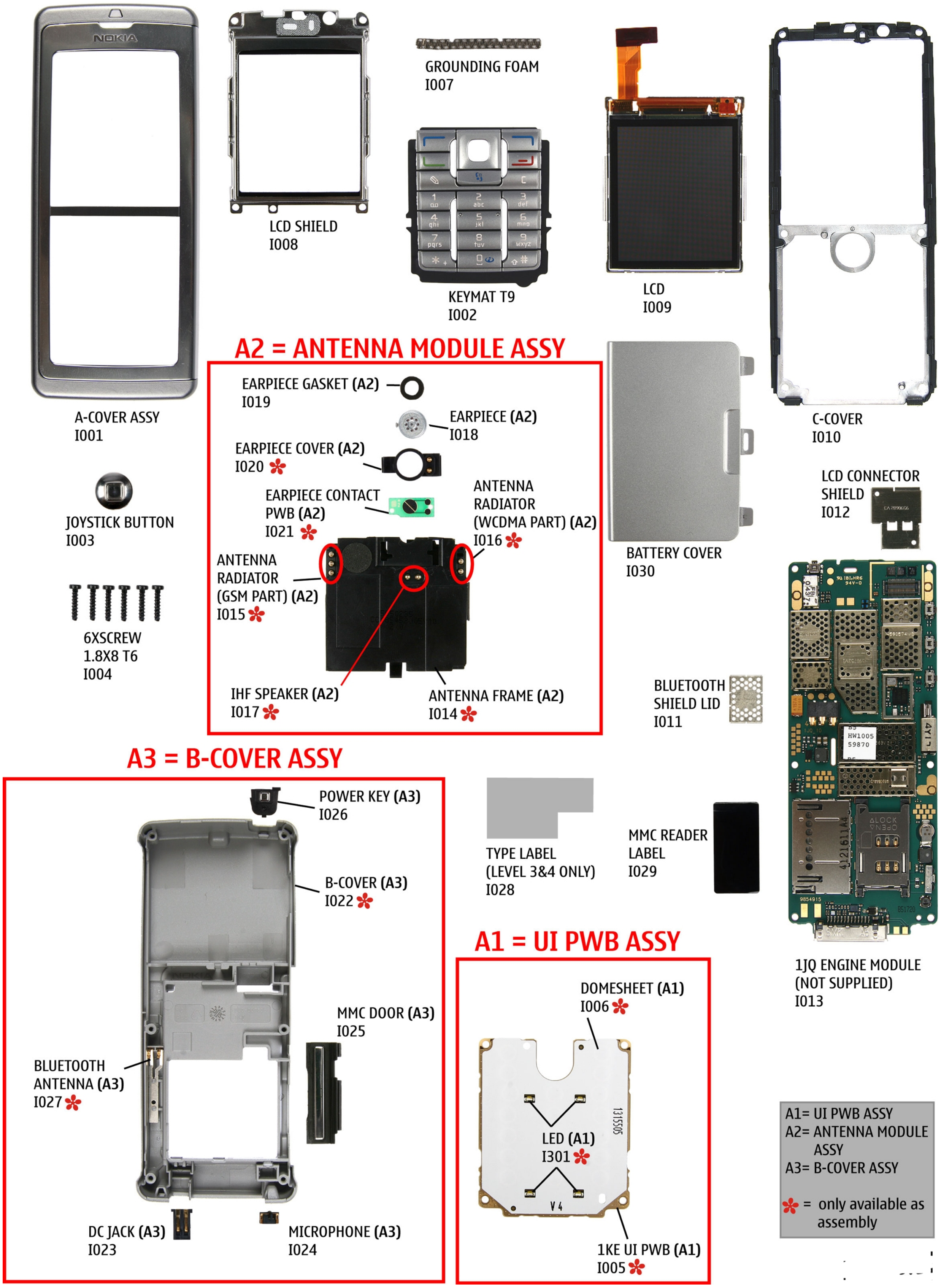
Exploded view

Exploded view


A-COVER ASSY I001
KEYMAT T9 I002
6XSCREW 1.8X8 T6 I004
GROUNDING FOAM I007
1KE UI PWB (A1) I005 ✱
LCD SHIELD I008
DOMESHEET (A1) I006 ✱
LCD I009
LED (A1) I301 ✱
JOYSTICK BUTTON I003
1JQ ENGINE MODULE (NOT SUPPLIED) I013
MMC READER LABEL I029
BLUETOOTH SHIELD LID I011
LCD CONNECTOR SHIELD I012
C-COVER I010
EARPIECE COVER (A2) ✱ I020
EARPIECE GASKET (A2) I019
IHF SPEAKER (A2) I017 ✱
EARPIECE (A2) I018
ANTENNA FRAME (A2) I014 ✱
EARPIECE CONTACT PWB (A2) ✱ I021
MMC DOOR (A3) I025
ANTENNA RADIATOR (WCDMA PART) (A2) ✱ I016
MICROPHONE (A3) I024
ANTENNA RADIATOR (GSM PART) (A2) ✱ I015
DC JACK (A3) I023
POWER KEY (A3) I026
BLUETOOTH ANTENNA (A3) I027 ✱
B-COVER (A3) ✱ I022
BATTERY COVER I030
TYPE LABEL (LEVEL 3&4 ONLY) I028
A1= UI PWB ASSY
A2= ANTENNA MODULE ASSY
A3= B-COVER ASSY
✱ = only available as assembly
● ELECTRO
● SILICON
● METAL
● PLASTIC
● PWB
● COVER

Mechanical spare parts overview


A-COVER ASSY I001
LCD SHIELD I008
GROUNDING FOAM I007
KEYMAT T9 I002
LCD I009
C-COVER I010
A2 = ANTENNA MODULE ASSY
EARPIECE GASKET (A2) I019
EARPIECE (A2) I018
EARPIECE COVER (A2) I020 ✻
EARPIECE CONTACT PWB (A2) I021 ✻
ANTENNA RADIATOR (WCDMA PART) (A2) I016 ✻
ANTENNA RADIATOR (GSM PART) (A2) I015 ✻
IHF SPEAKER (A2) I017 ✻
ANTENNA FRAME (A2) I014 ✻
JOYSTICK BUTTON I003
6XSCREW 1.8X8 T6 I004
BATTERY COVER I030
LCD CONNECTOR SHIELD I012
BLUETOOTH SHIELD LID I011
A3 = B-COVER ASSY
POWER KEY (A3) I026
B-COVER (A3) I022 ✻
MMC DOOR (A3) I025
BLUETOOTH ANTENNA (A3) I027 ✻
DC JACK (A3) I023
MICROPHONE (A3) I024
TYPE LABEL (LEVEL 3&4 ONLY) I028
MMC READER LABEL I029
1JQ ENGINE MODULE (NOT SUPPLIED) I013
A1 = UI PWB ASSY
DOMESHEET (A1) I006 ✻
LED (A1) I301 ✻
1KE UI PWB (A1) I005 ✻
A1= UI PWB ASSY
A2= ANTENNA MODULE ASSY
A3= B-COVER ASSY
✻ = only available as assembly

Parts lists

Mechanical spare parts list

ITEM/CIRCUIT REF.	QTY	PART NO	PART NAME
I001	1	XXXXXXX	A-COVER ASSY
I002	1	XXXXXXX	KEYMAT T9
I003	1	XXXXXXX	JOYSTICK BUTTON
I004	6	???????	SCREW 1,8X8 T6
A1	1	???????	UI PWB ASSY
I005	1	-	1KE UI PWB
I006	1	-	DOMESHEET
I301	4	-	LED
I007	1	???????	GROUNDING FOAM
I008	1	???????	LCD SHIELD
I009	1	???????	LCD
I010	1	???????	C-COVER
I011	1	???????	BLUETOOTH SHIELD LID
I012	1	???????	LCD CONNECTOR SHIELD
I013	1	-	1JQ ENGINE MODULE
A2	1	???????	ANTENNA MODULE ASSY
I014	1	-	ANTENNA FRAME
I015	1	-	ANTENNA RADIATOR (GSM PART)
I016	1	-	ANTENNA RADIATOR (WCDMA PART)
I017	1	-	IHF SPEAKER
I018	1	???????	EARPIECE
I019	1	???????	EARPIECE GASKET
I020	1	???????	EARPIECE COVER
I021	1	???????	EARPIECE CONTACT PWB
A3	1	XXXXXXX	B-COVER ASSY
I022	1	-	B-COVER
I023	1	???????	DC JACK
I024	1	???????	MICROPHONE
I025	1	XXXXXXX	MMC DOOR
I026	1	XXXXXXX	POWER KEY

ITEM/CIRCUIT REF.	QTY	PART NO	PART NAME
I027	1	-	BLUETOOTH ANTENNA
I028	1	???????	TYPE LABEL
I029	1	???????	MMC READER LABEL
I030	1	XXXXXXX	BATTERY COVER

- Bold = assembly (assy)
- XXXXXXX = variants
- ??????? = Code available in Bulletin
- I0xx = ITEM codes for upper or mono block
- I1xx = ITEM codes for hinge block
- I2xx = ITEM codes for lower block
- I3xx = ITEM codes for soldered spare parts in the upper hinge or lower block and not exchangeable

Note: For Nokia product codes, please refer to the latest Service Bulletins on the Partner Website (PWS). To ensure you are always using the latest codes, please check the PWS on a daily basis.

Parts list

Table 1 Component parts list (1jq-17e)

Item	Side	Grid ref.		Description and value		
A2000	Top	Q	5	SHIELD_040_009683	CPU SHIELD 040-009683	~
A3000	Bottom	K	4	SHIELD_040_008033	WLAN BB SHIELD 040-008033	~
A3001	Bottom	N	4	SHIELD_040_008016	WLAN RF SHIELD 040-008016	~
A6000	Bottom	I	3	SHIELD_040_008983	BT SHIELD ASSEMBLY	~
A7000	Bottom	G	5	SHIELD_040_011309	RF IC SHIELD 040-011309	~
A7001	Bottom	E	8	SHIELD_WCDMA_PA	WCDMA PA SHIELD 040-008134	~
A7002	Bottom	E	3	SHIELD_040_008078	GSM PA SHIELD 040-008078	~
A7003	Bottom	G	8	SHIELD_DMD11427	VCO CAN DMD11427 RM-1	~
B2200	Top	U	4	CRYSTAL_3.3X1.6_H0.9	CRYSTAL 32.768KHZ +-30PPM 12.5PF	32.768kHz
C2000	Bottom	U	4	0402C	Chipcap 5% NP0	27p
C2001	Bottom	V	4	0603C_H0.95	CHIPCAP X5R 470N K 25V 0603	470n
C2002	Bottom	U	6	0603C	CHIPCAP X5R 2U2 K 6V3 0603	2u2

Item	Side	Grid ref.		Description and value		
C2003	Bottom	U	5	0402C	CERCAP X7R 22N K 16V 0402	22n
C2004	Bottom	U	5	0402C	CERCAP X7R 22N K 16V 0402	22n
C2005	Bottom	U	6	0402C	Chipcap X7R 10% 16V 0402	10n
C2006	Bottom	U	6	0402C	Chipcap X7R 10% 16V 0402	10n
C2007	Bottom	U	7	0402C	Chipcap X7R 10% 16V 0402	10n
C2008	Bottom	U	7	0402C	Chipcap X7R 10% 16V 0402	10n
C2009	Bottom	U	6	0402C	Chipcap X7R 10% 16V 0402	10n
C2010	Bottom	U	7	0402C	Chipcap X7R 10% 16V 0402	10n
C2011	Top	V	3	0402C	CHIPCAP NP0 270P J 25V 0402	270p
C2071	Top	T	3	0402C	Chipcap 5% NP0	27p
C2100	Top	V	6	0402C	CHIPCAP X7R 15N K 16V 0402	15n
C2101	Top	V	6	0402C	CHIPCAP X7R 15N K 16V 0402	15n
C2102	Top	T	5	0603C	CHIPCAP X5R 2U2 K 6V3 0603	2u2
C2103	Bottom	C	7	0402C	Chipcap X7R 10% 50V 0402	1n0
C2104	Bottom	C	7	0402C	Chipcap X7R 10% 50V 0402	1n0
C2105	Bottom	C	4	0402C	Chipcap X7R 10% 50V 0402	1n0
C2106	Bottom	C	4	0405_2_P0.65	CHIP ARRAY X5R 2X1N K 16V 0405	2x1n
C2109	Bottom	L	1	0402C	Chipcap X7R 10% 50V 0402	1n0
C2110	Bottom	L	2	0402C	Chipcap X7R 10% 50V 0402	1n0
C2114	Bottom	L	8	0402C	Chipcap 5% NP0	27p
C2115	Bottom	L	8	0402C	Chipcap 5% NP0	27p

Item	Side	Grid ref.		Description and value		
C2200	Top	T	5	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5
C2201	Top	V	4	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5
C2202	Top	T	4	0402C	Chipcap X7R 10% 50V 0402	1n0
C2203	Top	U	4	0402C	Chipcap X7R 10% 50V 0402	1n0
C2204	Top	T	4	0402C	Chipcap X7R 10% 50V 0402	1n0
C2205	Top	O	4	0402C	Chipcap X7R 10% 50V 0402	1n0
C2206	Top	T	4	0402C	Chipcap X7R 10% 50V 0402	1n0
C2207	Top	U	3	0402C	Chipcap X7R 10% 50V 0402	1n0
C2208	Top	U	3	0402C	Chipcap 5% NP0	27p
C2209	Top	U	3	0402C	Chipcap 5% NP0	22p
C2210	Top	V	6	0603C	CHIPCAP X5R 1U K 16V 0603	1u0
C2211	Top	T	6	0805C_RKNM	CHIPCAP X5R 4U7 K 25V 0805	4u7
C2212	Top	U	5	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5
C2213	Top	V	4	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5
C2214	Top	V	5	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5
C2215	Top	V	5	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5
C2216	Top	V	5	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5
C2217	Top	V	4	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5
C2219	Top	V	4	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5
C2220	Top	U	5	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5
C2221	Top	U	5	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0

Item	Side	Grid ref.		Description and value		
C2222	Top	U	6	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C2223	Top	T	5	0402C	Chipcap X7R 10% 16V 0402	10n
C2224	Top	T	4	0402C	Chipcap X7R 10% 16V 0402	10n
C2225	Top	U	6	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C2226	Top	V	6	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C2227	Top	V	4	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C2228	Top	V	5	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C2230	Top	V	4	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C2231	Top	T	6	0805C	CHIPCAP X5R 10U M 6V3 0805	10U
C2232	Top	V	5	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C2233	Bottom	P	2	0402C	Chipcap 5% NP0	27p
C2235	Top	S	1	0402C	Chipcap X7R 10% 50V 0402	1n0
C2236	Top	V	5	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C2300	Top	R	3	0402C	Chipcap X7R 10% 16V 0402	10n
C2301	Top	R	2	0805C	CHIPCAP X5R 22U M 6V3 0805	22u
C2302	Top	R	1	0805C	CHIPCAP X5R 22U M 6V3 0805	22u
C2303	Top	T	2	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C2304	Top	R	2	0402C	Chipcap X7R 10% 16V 0402	10n
C2305	Top	T	1	TANTAL_TAJS	CHIPTCAP 1U M 25V 3.2X1.6X1.2	1u_2 5V
C2307	Top	S	3	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C2308	Top	T	1	0402C	Chipcap 5% NP0	100p

Item	Side	Grid ref.		Description and value		
C2309	Top	S	3	0805C	CHIPCAP X5R 22U M 6V3 0805	22u
C2310	Top	S	1	0402C	Chipcap 5% NP0	100p
C2312	Top	T	3	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5
C2313	Top	T	3	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C2314	Top	U	1	0805C_RKNM	CHIPCAP X5R 4U7 K 25V 0805	4u7
C2315	Top	T	2	0805C	CHIPCAP X5R 2U2 K 25V 0805	2u2
C2316	Top	U	2	0402C	Chipcap X7R 10% 50V 0402	1n0
C2700	Top	T	5	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C2800	Top	P	4	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C2801	Top	P	1	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C2802	Top	R	3	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C2803	Top	R	2	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C2804	Top	O	1	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C2805	Top	Q	4	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C2806	Top	O	3	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C2807	Top	P	1	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5
C2808	Top	P	1	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C2809	Top	Q	1	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C2810	Top	R	2	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C2811	Top	Q	1	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C2812	Top	R	3	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n

Item	Side	Grid ref.		Description and value		
C2813	Top	R	4	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C2814	Top	P	4	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C3000	Top	M	3	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C3001	Top	N	2	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C3002	Top	M	2	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C3003	Top	O	3	0402C	Chipcap X7R 10% 16V 0402	10n
C3004	Top	S	6	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C3005	Top	S	5	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C3006	Top	T	4	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C3007	Top	T	4	0402C	Chipcap X7R 10% 16V 0402	10n
C3008	Top	R	3	0402C_H0.6	CHIPCAP X5R 100N M 16V 0402	100n
C3100	Bottom	M	8	0402C	Chipcap 5% NP0	27p
C4200	Bottom	K	7	0805C	CHIPCAP X5R 22U M 6V3 0805	22u
C4201	Bottom	K	7	0805C	CHIPCAP X5R 22U M 6V3 0805	22u
C4202	Bottom	L	8	0402C	Chipcap X7R 10% 16V 0402	10n
C4405	Top	A	2	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C4407	Top	A	3	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C4408	Bottom	S	1	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4409	Bottom	S	2	0603C	CHIPCAP X5R 4U7 K 6V3 0603	4u7
C4410	Bottom	S	1	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4411	Bottom	S	1	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5

Item	Side	Grid ref.		Description and value		
C4413	Bottom	B	7	0402C	Chipcap 5% NP0	27p
C4414	Top	R	5	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C4415	Top	Q	5	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4416	Top	Q	5	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C4418	Top	R	4	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C4419	Top	P	4	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4420	Top	R	4	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4421	Top	O	6	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4422	Top	Q	6	0402C	Chipcap 5% NP0	27p
C4423	Top	N	8	0402C	Chipcap 5% NP0	27p
C4800	Top	P	6	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4801	Top	R	6	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C4802	Top	Q	6	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4803	Top	Q	6	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4804	Top	P	9	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4805	Top	P	6	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4806	Top	P	6	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4807	Top	O	7	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4808	Top	O	7	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4809	Top	Q	6	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4810	Top	P	9	0402C	CHIPCAP X5R 100N K 10V 0402	100n

Item	Side	Grid ref.		Description and value		
C4811	Top	Q	9	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4812	Top	R	6	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C4813	Top	P	9	0402C	Chipcap X7R 10% 50V 0402	1n0
C5000	Top	U	7	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C5001	Top	U	8	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C5002	Top	T	6	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C5003	Top	U	8	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C5004	Top	U	8	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C5005	Top	S	6	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C5006	Top	U	7	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C5200	Top	O	8	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C5201	Bottom	N	9	0402C	Chipcap X7R 10% 50V 0402	1n0
C5202	Bottom	N	8	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C6030	Bottom	I	3	0402C	Chipcap 5% NP0	100p
C6031	Bottom	J	3	0402C	Chipcap 5% NP0	15p
C6033	Bottom	I	3	0603C	CHIPCAP X5R 4U7 K 6V3 0603	4u7
C6036	Bottom	I	2	0603C	CHIPCAP X5R 4U7 K 6V3 0603	4u7
C6037	Bottom	I	2	0402C	CHIPCAP X5R 1U K 6V3 0402	1u0
C6038	Bottom	H	3	0402C	CHIPCAP X5R 1U K 6V3 0402	1u0
C6039	Bottom	I	3	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C6040	Bottom	I	3	0402C	CHIPCAP X5R 100N K 10V 0402	100n

Item	Side	Grid ref.		Description and value		
C6041	Bottom	H	3	0402C	CHIPCAP X5R 0U47 K 6.3V 0402	0u47
C6042	Bottom	I	3	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C6043	Bottom	I	2	0402C	CHIPCAP X5R 0U47 K 6.3V 0402	0u47
C6044	Bottom	H	2	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C6045	Bottom	H	2	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C6051	Bottom	H	3	0402C	Chipcap 5% NP0	10p
C6300	Bottom	K	2	0805C	CHIPCAP X5R 22U M 6V3 0805	22u
C6301	Bottom	K	3	0603C	CHIPCAP X5R 1U K 16V 0603	1u0
C6302	Bottom	L	3	0603C	CHIPCAP X5R 2U2 K 6V3 0603	2u2
C6303	Bottom	K	3	0603C	CHIPCAP X5R 1U K 16V 0603	1u0
C6304	Bottom	L	4	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C6305	Bottom	L	3	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C6307	Bottom	L	4	0402C	CHIPCAP X5R 1U K 6V3 0402	1u0
C6308	Bottom	K	5	0402C	Chipcap X7R 10% 50V 0402	1n0
C6309	Bottom	K	6	0402C	Chipcap X7R 10% 50V 0402	1n0
C6310	Bottom	L	5	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C6311	Bottom	K	5	0402C	chipcap x7r 47n k 10v 0402	47n
C6312	Bottom	L	6	0402C	CHIPCAP X5R 1U5 K 4V 0402	1u5
C6313	Bottom	K	6	0402C	Chipcap X7R 10% 50V 0402	1n0
C6314	Bottom	L	5	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C6315	Bottom	K	5	0402C	CHIPCAP X5R 100N K 10V 0402	100n

Item	Side	Grid ref.		Description and value		
C6317	Bottom	L	5	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C6318	Bottom	K	5	0402C	Chipcap X7R 10% 50V 0402	1n0
C6319	Bottom	L	5	0402C	Chipcap X7R 10% 50V 0402	1n0
C6320	Bottom	K	4	0402C	Chipcap X7R 10% 50V 0402	1n0
C6321	Bottom	L	4	0402C	Chipcap X7R 10% 50V 0402	1n0
C6322	Bottom	K	3	0402C	Chipcap X7R 10% 50V 0402	1n0
C6323	Bottom	L	4	0402C	Chipcap X7R 10% 50V 0402	1n0
C6324	Bottom	K	3	0402C	Chipcap X7R 10% 50V 0402	1n0
C6325	Bottom	K	4	0402C	Chipcap X7R 10% 50V 0402	1n0
C6326	Bottom	L	4	0402C	Chipcap X7R 10% 50V 0402	1n0
C6327	Bottom	K	3	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C6328	Bottom	M	4	0402C	Chipcap X7R 10% 50V 0402	1n0
C6329	Bottom	M	4	0402C	Chipcap +-0.25pF NP0	6p8
C6330	Bottom	M	4	0603C	CHIPCAP X5R 4U7 K 6V3 0603	4u7
C6331	Bottom	N	6	0402C	Chipcap +-0.25pF NP0	2p7
C6332	Bottom	N	6	0402C	Chipcap +-0.25pF NP0	1p0
C6333	Bottom	M	5	0402C	Chipcap X7R 10% 50V 0402	1n0
C6334	Bottom	M	5	0402C	Chipcap +-0.25pF NP0	8p2
C6335	Bottom	N	6	0402C	CHIPCAP NP0 220P J 25V 0402	220p
C6336	Bottom	N	4	0402C	Chipcap +-0.25pF NP0	3p9
C6337	Bottom	N	4	0402C	Chipcap +-0.25pF NP0	1p0
C6338	Bottom	N	5	0402C	Chipcap 5% NP0	47p
C6339	Bottom	N	4	0402C	Chipcap 5% NP0	15p
C6340	Bottom	N	3	0402C	Chipcap +-0.25pF NP0	6p8

Item	Side	Grid ref.		Description and value		
C6341	Bottom	N	4	0402C	Chipcap +-0.25pF NP0	6p8
C6342	Bottom	M	3	0402C	Chipcap +-0.25pF NP0	6p8
C6343	Bottom	N	3	0402C	Chipcap +-0.25pF NP0	6p8
C6344	Bottom	L	6	0402C	Chipcap +-0.25pF NP0	2p7
C6345	Bottom	K	6	0402C	Chipcap +-0.25pF NP0	2p7
C6346	Bottom	K	4	0402C	Chipcap X7R 10% 50V 0402	1n0
C6347	Bottom	K	4	0402C	Chipcap 5% NP0	82p
C6348	Bottom	K	5	0402C	CHIPCAP X5R 1U K 6V3 0402	1u0
C6351	Bottom	K	3	0402C	Chipcap X7R 10% 50V 0402	1n0
C6352	Bottom	K	6	0402C	Chipcap 5% NP0	150p
C6360	Bottom	L	6	0402C	CHIPCAP NP0 220P J 25V 0402	220p
C6361	Bottom	K	6	0402C	CHIPCAP NP0 220P J 25V 0402	220p
C6364	Bottom	M	3	0402C	Chipcap +-0.25pF NP0	6p8
C6365	Bottom	M	3	0402C	Chipcap +-0.25pF NP0	6p8
C6410	Bottom	L	3	0402C	Chipcap X7R 10% 50V 0402	1n0
C7501	Bottom	D	5	0402C	Chipcap 5% NP0	18p
C7503	Bottom	E	4	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C7504	Bottom	E	5	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C7505	Bottom	F	5	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C7507	Bottom	E	6	0402C	Chipcap 5% NP0	18p
C7508	Bottom	E	6	0402C	Chipcap 5% NP0	18p
C7509	Bottom	D	6	0402C	Chipcap +-0.25pF NP0	2p7
C7512	Bottom	D	3	0402C	Chipcap +-0.25pF NP0	3p3
C7513	Bottom	F	5	0402C	Chipcap X7R 10% 25V 0402	4n7
C7514	Bottom	D	3	0402C	Chipcap +-0.25pF NP0	3p3
C7515	Bottom	G	5	0402C	Chipcap 5% NP0	10p
C7516	Bottom	G	6	0402C	Chipcap 5% NP0	150p

Item	Side	Grid ref.		Description and value		
C7518	Bottom	D	4	0402C	CHIPCAP X5R 100N K 10V 0402	100n
C7520	Bottom	D	5	0402C	Chipcap 5% NP0	18p
C7522	Bottom	F	6	0402C	Chipcap 5% NP0	150p
C7523	Bottom	C	3	0402C	Chipcap +-0.25pF NP0	3p9
C7524	Bottom	G	6	0603C	CHIPCAP NP0 2N2 G 16V 0603	2n2
C7525	Bottom	C	3	0402C	Chipcap +-0.25pF NP0	3p9
C7526	Bottom	G	5	0402C	Chipcap +-0.25pF NP0	2p7
C7527	Bottom	E	6	0402C	Chipcap 5% NP0	100p
C7528	Bottom	E	6	0402C	Chipcap 5% NP0	22p
C7529	Bottom	F	5	0402C	Chipcap X7R 10% 50V 0402	1n0
C7530	Bottom	F	5	0402C	Chipcap X7R 10% 16V 0402	8n2
C7531	Bottom	E	6	0402C	Chipcap 5% NP0	22p
C7532	Bottom	F	5	0402C	Chipcap X7R 10% 16V 0402	8n2
C7533	Bottom	G	4	0402C	Chipcap X7R 5% 16V 0402	10n
C7534	Bottom	E	4	0402C	Chipcap X7R 10% 16V 0402	8n2
C7536	Bottom	E	5	0402C	Chipcap X7R 10% 16V 0402	8n2
C7541	Bottom	G	5	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C7543	Bottom	H	5	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C7545	Bottom	F	4	0402C	Chipcap +-0.25pF NP0	4p7
C7547	Bottom	H	4	0402C	Chipcap +-0.25pF NP0	1p8
C7548	Bottom	G	4	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C7549	Bottom	G	6	0402C	Chipcap 5% NP0	100p
C7550	Bottom	I	4	0402C	Chipcap +-0.25pF NP0	2p7
C7552	Bottom	I	5	0402C	Chipcap +-0.25pF NP0	2p7
C7553	Bottom	I	5	0402C	Chipcap X7R 10% 16V 0402	8n2
C7554	Bottom	H	7	0402C	Chipcap +-0.25pF NP0	4p7

Item	Side	Grid ref.		Description and value		
C7555	Bottom	H	7	0402C	CHIPCAP NP0 0P5 C 50V 0402	0p5
C7556	Bottom	F	2	0402C	Chipcap 5% NP0	10p
C7558	Bottom	H	6	0402C	Chipcap 5% X7R	1n0
C7559	Bottom	E	2	0402C	Chipcap +-0.25pF NP0	1p0
C7560	Bottom	I	5	0402C	Chipcap X7R 10% 25V 0402	4n7
C7561	Bottom	F	2	0402C	Chipcap +-0.25pF NP0	4p7
C7562	Bottom	I	8	0402C	Chipcap +-0.25pF NP0	2p7
C7563	Bottom	E	2	0402C	Chipcap +-0.25pF NP0	4p7
C7564	Bottom	E	3	0402C	Chipcap 5% X7R	1n0
C7567	Bottom	H	6	0402C	Chipcap 5% NP0	15p
C7568	Bottom	I	4	0402C	Chipcap 5% NP0	150p
C7569	Bottom	E	2	0603C	CHIPCAP X5R 4U7 K 6V3 0603	4u7
C7570	Bottom	I	5	0402C	Chipcap 5% NP0	18p
C7571	Bottom	H	9	0402C	CHIPCAP NP0 330P J 50V 0402	330p
C7572	Bottom	G	2	0402C	Chipcap +-0.25pF NP0	2p7
C7573	Bottom	I	4	0603C	CHIPCAP NP0 2N2 G 16V 0603	2n2
C7575	Bottom	I	6	0402C	Chipcap 5% NP0	15p
C7577	Bottom	I	6	0402C	Chipcap 5% NP0	15p
C7579	Bottom	D	7	0402C	Chipcap 5% NP0	10p
C7580	Bottom	D	8	0603C	CHIPCAP X5R 1U K 6V3 0603	1u0
C7581	Bottom	D	3	0402C	Chipcap +-0.25pF NP0	4p7
C7582	Bottom	I	5	0402C	Chipcap 5% NP0	100p
C7583	Bottom	F	7	0603C	CHIPCAP X5R 4U7 K 6V3 0603	4u7
C7584	Bottom	D	3	0402C	Chipcap +-0.25pF NP0	4p7
C7585	Bottom	E	8	0402C	CHIPCAP NP0 1P0 B 50V 0402	1p0
C7586	Bottom	E	9	0402C	Chipcap 5% NP0	10p
C7587	Bottom	E	9	0402C	Chipcap 5% NP0	10p
C7589	Bottom	F	8	0603C	CHIPCAP X5R 4U7 K 6V3 0603	4u7

Item	Side	Grid ref.		Description and value		
C7590	Bottom	E	8	0402C	Chipcap 5% NP0	10p
C7591	Bottom	E	7	0402C	CHIPCAP NP0 470P J 6V3 0402	470p
C7592	Bottom	E	7	0402C	Chipcap 5% X7R	3n3
C7593	Bottom	F	2	0603C	CHIPCAP X5R 4U7 K 6V3 0603	4u7
C7594	Bottom	E	2	0402C	Chipcap +-0.25pF NP0	2p7
C7596	Bottom	D	5	0402C	Chipcap +-0.25pF NP0	2p7
C7597	Bottom	I	9	TANT_C_6.2X3.4_H1.7	CHIPTCAP 150U M 10V 6X3.2X1.5	150u_10V
C7598	Bottom	G	5	0402C	CHIPCAP NP0 0P5 C 50V 0402	0p5
C7599	Bottom	H	7	0402C	Chipcap +-0.25pF NP0	2p7
D2800	Top	Q	3	uBGA_289	RAP3G V2.20E-PA UMC8D F761800F 12C027	~
D3000	Top	N	2	PBFREEBGA40_64MB_66MHZ_MAX	FLASH 4MX16 1.8/1.8V FBGA44 PBFREE	4Mx16
D3001	Top	S	4	WBGA_60_8.1X6.6_H0.9	SDRAM 4X16 1.8V/1.8V FBGA60 PBFREE	4Mx16
D4400	Top	P	5	FCBGA121_8.2X8.2	LCD CONTROLLER S1D13743 1.8V FBGA121	~
D4800	Top	Q	7	uBGA_289	HELEN3 PS2.0 N3 F761909 C27 UBGA289	~
D5000	Top	S	7	FBGA133_11.6X13.1	COMBO 512 DDR + 1G NAND FBGA133 PBFREE	32Mx16/128Mx8
D6030	Bottom	H	2	XBGA_N5_H0.625	OR-GATE 2INPUT 74LVC1G32YZTR WCSP-5	~
F2000	Bottom	V	3	0603_FUSE_AVX2MATS	SM FUSE F 2.0A 32V	2A
G2200	Bottom	Q	1	BATTER_RB414H	RTC CAPACITOR 15UAH 2.6/3.3V 414-SIZE	3V3
G6030	Bottom	H	3	VCTCXO_3.4X2.7_4P2_H1.0	TCXO 38.4MHZ +-10PPM 2.78V	38.4 MHz

Item	Side	Grid ref.		Description and value		
G7500	Bottom	G	5	VCO_FDK_IT_H1.7	VCO 3610-4340MHZ 2.7V 14MA	3610-4340 MHz
G7501	Bottom	F	4	NKG3176B_H1.0	VCTCXO 38.4MHZ 2.5V 2MA	38.4 MHz
G7502	Bottom	G	8	VCO_FDK_IT_H1.7	VCO 3420-3960MHZ 2.7V 14MA WCDMA FDD	3420-3960 MHz
L2000	Bottom	U	4	0603_BLM	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R / 100M Hz
L2001	Bottom	U	6	0405_2_MATSU	CHIP BEAD ARRAY 2X1000R 0405	2x1000R/ 100M Hz
L2002	Bottom	U	6	0405_2_MATSU	CHIP BEAD ARRAY 2X1000R 0405	2x1000R/ 100M Hz
L2003	Bottom	U	7	0405_2_MATSU	CHIP BEAD ARRAY 2X1000R 0405	2x1000R/ 100M Hz
L2100	Bottom	C	7	0405_2_MATSU	CHIP BEAD ARRAY 2X1000R 0405	2x1000R/ 100M Hz
L2101	Bottom	K	8	0603_BLM	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R / 100M Hz
L2102	Bottom	C	5	COIL_0603CS	CHIP COIL 33N G Q40/250MHZ 0603	33nH
L2103	Bottom	C	5	COIL_0603CS	CHIP COIL 33N G Q40/250MHZ 0603	33nH
L2104	Bottom	K	8	0603_BLM	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R / 100M Hz
L2105	Bottom	M	2	0603_BLM	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R / 100M Hz

Item	Side	Grid ref.		Description and value		
L2106	Bottom	M	2	0603_BLM	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R / 100M Hz
L2202	Top	V	6	0603_BLM	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R / 100M Hz
L2203	Top	V	5	FERRITE_0402	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R / 100M Hz
L2204	Top	V	4	FERRITE_0402	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R / 100M Hz
L2205	Top	U	6	0603_BLM	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R / 100M Hz
L2206	Top	V	5	FERRITE_0402	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R / 100M Hz
L2301	Top	R	3	0603_BLM	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R / 100M Hz
L2302	Bottom	R	1	CHOKE_SER400	CHOKE 10U 0.8A 0R24 4X4X1.8	10uH
L2304	Bottom	U	1	CHOKE_SER300_H1.5	CHOKE 22U M 0R7 0.35A 3.0x3.0x1.5	22uH
L4200	Bottom	L	7	CHOKE_SER400	CHOKE 10U 0.8A 0R24 4X4X1.8	10uH
L4201	Bottom	K	8	0603_BLM	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R / 100M Hz
L4401	Top	A	2	FERRITE_0402	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R / 100M Hz

Item	Side	Grid ref.		Description and value		
L4403	Top	A	3	FERRITE_0402	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/100MHz
L4404	Top	Q	4	FERRITE_0402	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/100MHz
L4405	Top	T	4	FERRITE_0402	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/100MHz
L5200	Top	O	8	FERRITE_0402	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/100MHz
L6030	Bottom	J	2	0402L	CHIP COIL 22N J Q28/800M 0402	22nH
L6031	Bottom	I	3	0402L	CHIP COIL 2N2+-0N3 Q30/800M 0402	2n2H
L6301	Bottom	M	5	0402L_H0.45	CHIP COIL 1N8 +-0N1 Q40/1GHZ 0402	1n8H
L6302	Bottom	N	6	0402L_H0.45	CHIP COIL 2N7 +-0N1 Q53/2.4G 0402	2n7H
L6303	Bottom	M	4	0402L_H0.45	CHIP COIL 2N2 +-0N1 Q40/1GHZ 0402	2n2H
L6304	Bottom	M	5	0402L_POL2	CHIP COIL 12N J Q30/250MHZ 0402	12nH
L6305	Bottom	N	5	0402L	CHIP COIL 10N J Q30/800M 0402	10nH
L7502	Bottom	I	5	0402L	CHIP COIL 100N J Q16/300M 0402	100nH
L7503	Bottom	G	4	FERRITE_0402	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/100MHz
L7504	Bottom	D	3	0402L	CHIP COIL 27N J Q27/800M 0402	27nH
L7505	Bottom	D	3	0402L	CHIP COIL 12N J Q31/800M 0402	12nH
L7506	Bottom	C	3	0402L	CHIP COIL 12N J Q31/800M 0402	12nH

Item	Side	Grid ref.		Description and value		
L7510	Bottom	H	6	0402L	CHIP COIL 4N7 +-0N3 Q28/800M 0402	4n7H
L7511	Bottom	H	6	0402L	CHIP COIL 10N J Q30/800M 0402	10nH
L7512	Bottom	H	6	0402L	CHIP COIL 4N7 +-0N3 Q28/800M 0402	4n7H
L7514	Bottom	D	8	0402L	CHIP COIL 6N8 J Q27/800M 0402	6n8H
L7515	Bottom	F	8	CHOKE_SER400	CHOKE 10U 0.8A 0R24 4X4X1.8	10uH
L7516	Bottom	G	2	FERRITE_0402	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/100MHz
L7517	Bottom	H	4	0402L	CHIP COIL 1N5 +-0N3 Q33/800M 0402	1n5H
M2100	Bottom	K	1	VIBRA_M_KHN4NX1RA	SMD VIBRA MOTOR 1.3V 90MA 9000RPM	~
N2200	Top	U	5	TFBGA_108	RETU 3.02 TSA1GJWE TFBGA108	~
N2300	Top	S	2	TFBGA_84_6.15X6.15	TAHVO V5.2 LF TFBGA84	~
N2301	Top	U	2	USMD8_1.69X1.69	WHITE LED DRIVER 4LEDS 500MW 8BUMP USMD8	~
N4200	Bottom	L	8	USMD_10_2.458X1.899	DC/DC CONV LM3661-1.40V/1.05V NOPB	~
N4401	Bottom	S	1	IRDA_CIM_50M5_T	IRDA CIM-50M5A **RESERVED**	~
N4402	Top	Q	4	FC_4_0.99X0.99	LI VREG 1.5V/150MA WLCSP4 TK63115B	~
N5200	Bottom	N	9	TSOP_6L_H1.1	HALL IC SWITCH TLE4917 TSSOP6	~
N6030	Bottom	I	3	uBGA63_4.6X4.6	BRF6150	~
N6031	Bottom	H	3	FC_4_0.99X0.99	LI VREG TK63128B 2.8V WLCSP4	~
N6300	Bottom	K	5	LFBGA_228	WLAN MCM STLC4370 F3 LINEAR EM LFBGA228	~
N6301	Bottom	N	5	QFN3X3_16	PW AMP RF5191 2.4-2.5GHZ WLAN	~

Item	Side	Grid ref.		Description and value		
N6302	Bottom	N	5	SOT_666	TRX2+RX4 PEMD9 N&P 10K/47K 0W12 SOT666	~
N6303	Bottom	N	4	MINI_MOLD6_H0.6	L/S BAND SPDT SWITCH uPG2030TK 1.6X1.4	~
N6304	Bottom	N	3	MINI_MOLD6_H0.6	L/S BAND SPDT SWITCH uPG2030TK 1.6X1.4	~
N7500	Bottom	E	5	TFBGA_84_6.15X6.15	RF ASIC HINKU310A TFBGA84	~
N7501	Bottom	H	5	TFBGA64_H1.2	RF ASIC VINKU314A TFBGA64	~
N7502	Bottom	F	3	RITSA_PA_REL3	PW AMP RF9292E9.2 QUADBAND	~
N7503	Bottom	D	7	RF9252E2.1	PW AMP RF9252E8.2 1920-1980MHZ	~
N7504	Bottom	F	8	USMD10_2.534X2.026	DC CONV SUPA LM2706 PBFREE	~
R2000	Bottom	U	5	0402R	Resistor 5% 63mW	220R
R2001	Bottom	U	5	uBGA11_2.15X1.65	ASIP MIC W/ESD RES +CAP+ZDI BGA11	~
R2002	Bottom	U	6	0402R	Resistor 5% 63mW	10R
R2003	Bottom	U	6	0402R	Resistor 5% 63mW	10R
R2004	Bottom	U	7	0402R	Resistor 5% 63mW	10R
R2005	Bottom	U	7	0402R	Resistor 5% 63mW	10R
R2006	Bottom	U	7	uBGA5	ASIP 4XESD **PB-FREE** BGA5	~
R2007	Top	U	3	uBGA11_1.6X2.15	ASIP SILIC USB OTG / ESD BGA11	~
R2009	Top	V	3	0402R	Resistor 5% 63mW	100R
R2010	Top	T	2	0402R	Resistor 5% 63mW	220k
R2011	Top	V	3	0402R	Resistor 5% 63mW	120k
R2070	Bottom	I	7	0402_VAR	CHIP VARISTOR VWM15V VC50V 0402	15V/50V
R2071	Top	U	8	0402_NTH5	NTC RES 47K J B=4050 +-3% 0402	47k
R2100	Top	V	7	FLIP_CHIP_8_1.7X1.7	ASIP SINGLE ENDED MICROPHONE INTERF BGA8	~

Item	Side	Grid ref.		Description and value		
R2101	Top	T	4	0402R	Resistor 5% 63mW	220R
R2104	Bottom	B	7	0402_VAR	CHIP VARISTOR VWM15V VC50V 0402	15V/ 50V
R2105	Bottom	C	7	0402_VAR	CHIP VARISTOR VWM15V VC50V 0402	15V/ 50V
R2106	Bottom	C	4	0405_2	VARISTOR ARRAY 2XVWM16V VC50 0405	2XVWM16V
R2200	Top	T	5	0402R	Resistor 5% 63mW	100k
R2201	Top	T	3	0402R	Resistor 5% 63mW	120k
R2202	Top	U	3	0402R	CHIPRES 0W06 2M2 J 0402	2M2
R2205	Top	U	3	0402R	Resistor 5% 63mW	4k7
R2304	Top	U	2	0402R	Resistor 5% 63mW	33R
R2305	Top	N	1	0402R	Resistor 5% 63mW	39R
R2306	Top	N	1	0402R	Resistor 5% 63mW	220R
R2307	Top	S	3	0402R	Resistor 5% 63mW	100R
R2700	Top	S	6	uBGA8_1.47X1.47	ASIP SIM INTERFACE **LOW CAP**BGA8	~
R3000	Top	M	2	0402R	Resistor 5% 63mW	4k7
R4414	Top	U	4	0402R	Resistor 5% 63mW	470k
R4415	Top	A	4	0402R	Resistor 5% 63mW	100k
R4416	Top	A	4	0402_NTH5	NTC RES 47K J B=4050 +-3% 0402	47k
R4417	Top	A	4	0402R	Resistor 5% 63mW	470k
R4423	Bottom	T	2	0805R_THERM1	CHIPRES 0W125 4R7 J 0805	4R7
R4427	Bottom	B	7	0402R	Resistor 5% 63mW	4k7
R4432	Top	O	7	0402R	Resistor 5% 63mW	1k0
R4433	Top	O	7	0402_VAR	CHIP VARISTOR VWM15V VC50V 0402	15V/ 50V
R4434	Top	T	4	0402R	Resistor 5% 63mW	10R
R4451	Top	O	6	0402R	Resistor 5% 63mW	100R
R4454	Top	Q	6	0402R	Resistor 5% 63mW	100R
R4455	Top	N	8	0402R	Resistor 5% 63mW	100R
R4800	Top	Q	6	0402R	Resistor 5% 63mW	10R
R4801	Bottom	K	8	0402R	Resistor 5% 63mW	47R

Item	Side	Grid ref.		Description and value		
R4802	Bottom	K	8	0402R	Resistor 5% 63mW	47R
R4809	Top	R	5	0402R	Resistor 5% 63mW	1k0
R5100	Bottom	L	8	0402R	Resistor 5% 63mW	10k
R5200	Top	O	9	uBGA11_1.62X2.12	ASIP EMIF04-MMC02F2**PB-FREE**	~
R5201	Bottom	N	9	0402R	Resistor 5% 63mW	100k
R5202	Bottom	N	8	0402R	Resistor 5% 63mW	100R
R6054	Bottom	H	2	0402R	Resistor 5% 63mW	100k
R6055	Bottom	H	2	0402R	Resistor 5% 63mW	100k
R6065	Bottom	H	2	0402R	Resistor 5% 63mW	10k
R6300	Bottom	L	4	0402R	CHIPRES 0W06 1M F 100PPM 0402	1M0
R6301	Bottom	K	4	0402R	Resistor 5% 63mW	1k2
R6354	Bottom	K	6	0402R	Resistor 5% 63mW	3k3
R6370	Bottom	O	1	0402R	Resistor 5% 63mW	470R
R6424	Bottom	K	3	0402R	Resistor 5% 63mW	100R
R6441	Bottom	M	5	0402R	Resistor 5% 63mW	47R
R6442	Bottom	N	5	0402R	Resistor 5% 63mW	4k7
R6443	Bottom	N	5	0402R	Resistor 5% 63mW	220R
R7501	Bottom	G	6	0402R	Resistor 5% 63mW	1k0
R7502	Bottom	G	5	0402R	Chipres 0W06 5R6 J 0402	5R6
R7503	Bottom	I	5	0402R	Resistor 5% 63mW	4k7
R7504	Bottom	E	5	0402R	CHIPRES 0W06 10K F 0402	10k
R7505	Bottom	F	6	0402R	CHIPRES 0W06 8K2 F 0402	8k2
R7506	Bottom	E	2	0402R	Resistor 5% 63mW	33R
R7509	Bottom	G	4	0402R	Resistor 5% 63mW	22k
R7512	Bottom	G	2	0404_RAC10	RES NETWORK 0W04 2DB ATT 0404	436R / 11R6 / 436R
R7514	Bottom	G	6	0402R	Resistor 5% 63mW	12k
R7516	Bottom	E	3	0402R	Resistor 5% 63mW	1k0
R7518	Bottom	E	4	0402R	Resistor 5% 63mW	470k

Item	Side	Grid ref.		Description and value		
R7519	Bottom	I	4	0402R	Resistor 5% 63mW	1k0
R7520	Bottom	H	6	0402R	Resistor 5% 63mW	270R
R7521	Bottom	H	5	0402R	CHIPRES 0W06 10K F 0402	10k
R7522	Bottom	F	7	0402R	Resistor 5% 63mW	220k
R7523	Bottom	I	4	0402R	CHIPRES 0W06 9K1 F 100PPM 0402	9k1
R7525	Bottom	F	7	0402R	Resistor 5% 63mW	10R
R7526	Bottom	E	8	0402R	Resistor 5% 63mW	5k6
R7527	Bottom	E	8	0402R	Resistor 5% 63mW	220R
R7528	Bottom	H	4	0402R	Resistor 5% 63mW	470k
R7529	Bottom	E	8	0402R	Resistor 5% 63mW	2k2
R7530	Bottom	E	7	0402R	Resistor 5% 63mW	8k2
R7531	Bottom	E	7	0402R	Resistor 5% 63mW	8k2
R7534	Bottom	E	4	0402R	Resistor 5% 63mW	470k
R7537	Bottom	H	7	0402R	Chipres 0W06 5R6 J 0402	5R6
S4429	Top	N	5	SWITCH_EVZ_Q7_V 2_H6.0	SWITCH STICK EVQQ7JC58	~
S4436	Bottom	A	8	SWITCH_EVQP7A0 1K	SM SW TACT SPST 12V SIDE KEY 2.2N	~
S4437	Bottom	H	1	SWITCH_EVQP7A0 1K	SM SW TACT SPST 12V SIDE KEY 2.2N	~
S4438	Bottom	D	1	SWITCH_EVQP7A0 1K	SM SW TACT SPST 12V SIDE KEY 2.2N	~
S4439	Bottom	F	1	SWITCH_EVQP7A0 1K	SM SW TACT SPST 12V SIDE KEY 2.2N	~
T6030	Bottom	J	3	TRANS_LDB213	TRANSF BALUN 2400 +-100MHZ	~
T6300	Bottom	L	6	LDB18DM	TRANSF BALUN 2400 +-50MHZ	~
T7500	Bottom	D	6	TRANS_LDB15	TRANSF BALUN 2134 +-90MHZ 0805	~
T7501	Bottom	F	6	TRANS_LDB15	TRANSF BALUN 3800 +-550MHZ 0805	~
T7502	Bottom	G	3	TRANS_LDB15	TRANSF BALUN 1800 +-100mhz 2x1.25	~
T7503	Bottom	G	7	TRANS_LDB15	TRANSF BALUN 3800 +-550MHZ 0805	~

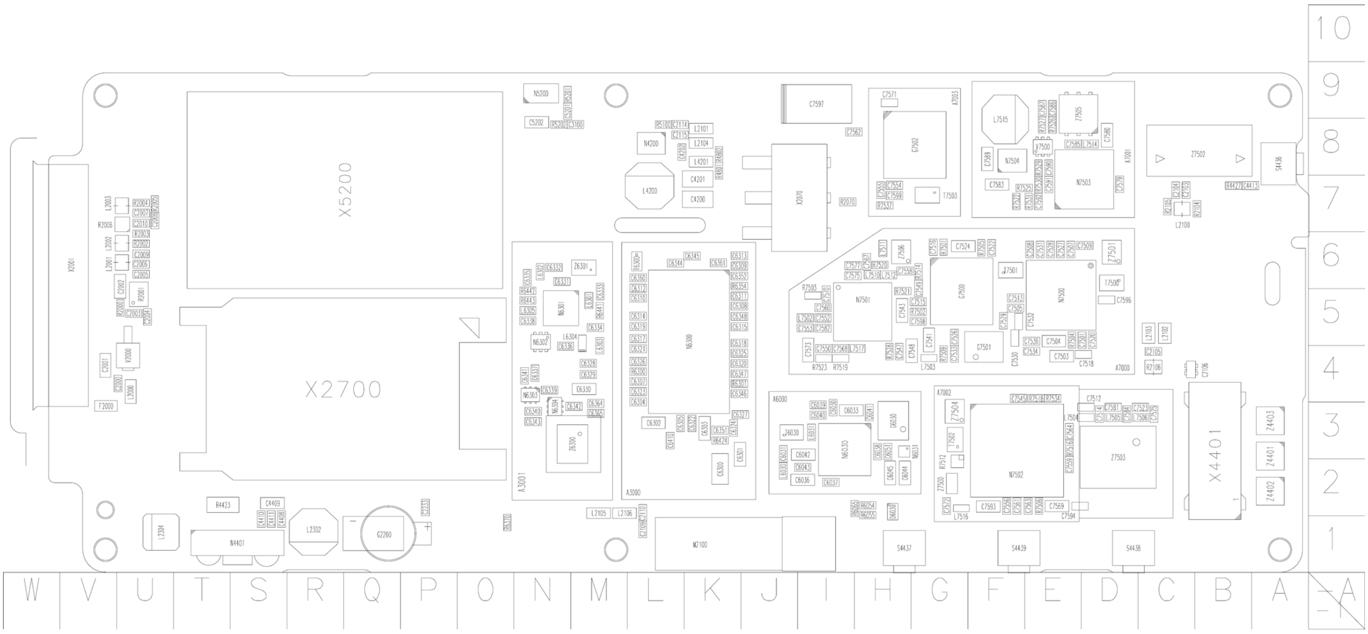
Item	Side	Grid ref.		Description and value		
V2000	Bottom	U	4	CASE_457	TVS DI 1PMT16AT3 16V 175W PWRMITE	~
V2300	Top	N	1	SOT_666	TRX2 BIPOLAR 2XPNP 40V 0A1 0W12 SOT666	~
V2301	Top	T	3	SOD323F	SCH DI 30V 2A SOD323F	~
V4401	Top	N	9	VMT3_R	TR DTC143ZM N RB=4K7 RBE=47K VMT3	~
V4410	Top	A	5	PT202MR0MP	DI PHOTO PT202MR0MP 620NM 1.25X2	~
V7500	Bottom	E	8	SOT_563	SCHDIX2 RF DETECTOR CT 1PF 0V39 SOT666	~
X2001	Bottom	V	6	SYSCON_MQ202_NK_14R3	SM SYSTEM CONNECTOR 14POL	~
X2060	Top	A	3	TRACEABILITY_PAD	MODULE ID COMPONENT 2.8X1.8X0.3	~
X2070	Bottom	I	7	LYNX_BATT_CONN_H7.5	SM LYNX BATT.CONN 3POL HEIGHT 7.3	~
X2700	Bottom	R	4	SIM_CONN_P04_100157_001	SM SIM CONN 2X3POL P2.54 50V 0.5A	~
X4400	Top	N	7	CPBT_297884_6	SM CONN 2X8 SPR 50V 0.5A PCB/PCB	~
X4401	Bottom	B	3	JST_C03_00352_200_MIRROR	SM CONN PORTABLE 2X20 P0.4PWB SMD	~
X5003	Top	A	7	COAX_MM8430	CONN SM COAX+ SW F 50R 250V 6GHZ	~
X5200	Bottom	Q	7	MOLEX_MMC_P03_3D0545_001	CONN SMC RS-MMC 6POL P2.5	~
Z2000	Top	V	3	FERRITE_0402	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R / 100MHz
Z2001	Top	V	3	FERRITE_0402	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R / 100MHz

Item	Side	Grid ref.		Description and value		
Z2003	Top	V	3	FERRITE_0402	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R / 100MHz
Z4400	Top	O	7	uBGA24_2.62X2.62	ASIP EMIF10-1K010F2 **PB-FREE**	~
Z4401	Bottom	A	3	uBGA25_2.47X2.47	ASIP 10-CH ESD EMI FILTER BGA25	~
Z4402	Bottom	A	2	uBGA25_2.47X2.47	ASIP 10-CH ESD EMI FILTER BGA25	~
Z4403	Bottom	A	3	uBGA25_2.47X2.47	ASIP 10-CH ESD EMI FILTER BGA25	~
Z6300	Bottom	M	3	FILTER_LFB322G	CER FILT 2450 +-50MHZ 3.2X2.5	2450 MHz
Z6301	Bottom	M	6	LFSG15	CER FILT 2450 +-50MHZ/3.0DB 2.0X1.2	2450 MHz
Z7500	Bottom	G	2	FERRITE_FBMJ1608	FERRITE BEAD 0R01 28R/100MHZ 0603	28R/ 100MHz
Z7501	Bottom	D	6	FILTER_SAW_2.1X1.7_H0.8	SAW FILTER 2140 +-30MHZ 2.0X1.6X1.0	2140 MHz
Z7502	Bottom	B	8	DFYK61G95LBJCB	DUPL 1920-1980/2110-2170MHZ 9X4.3	1920-1980 / 2110-2170 MHz
Z7503	Bottom	D	3	ANT_SW_M043B	ANT.SW+3SAW 880-960/1710-1990 MHZ	~
Z7504	Bottom	G	3	FILTER_SAW_2.1X1.7_H0.8	SAW FILTER 897.5 +-17.5MHZ 2.0X1.6	897.5 MHz
Z7505	Bottom	E	9	ISOLATOR_CEZ0047	ISOLATOR 1950 +-30MHZ 13DB 3.3X3.4X1.6	~
Z7506	Bottom	H	6	FILTER_SAW_2.1X1.7_H0.8	SAW FILTER 1950 +-30MHZ 2.0X1.6X1.0	1950 MHz

Note: For Nokia product codes, please refer to the latest Service Bulletins on the Partner Website (PWS).
To ensure you are always using the latest codes, please check the PWS on a daily basis.

Component layouts

Component layout - bottom 1jq_17e


X5200
X2700
X4401
10
9
8
7
6
5
4
3
2
1
W
V
U
T
S
R
Q
P
O
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M
L
K
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G
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C
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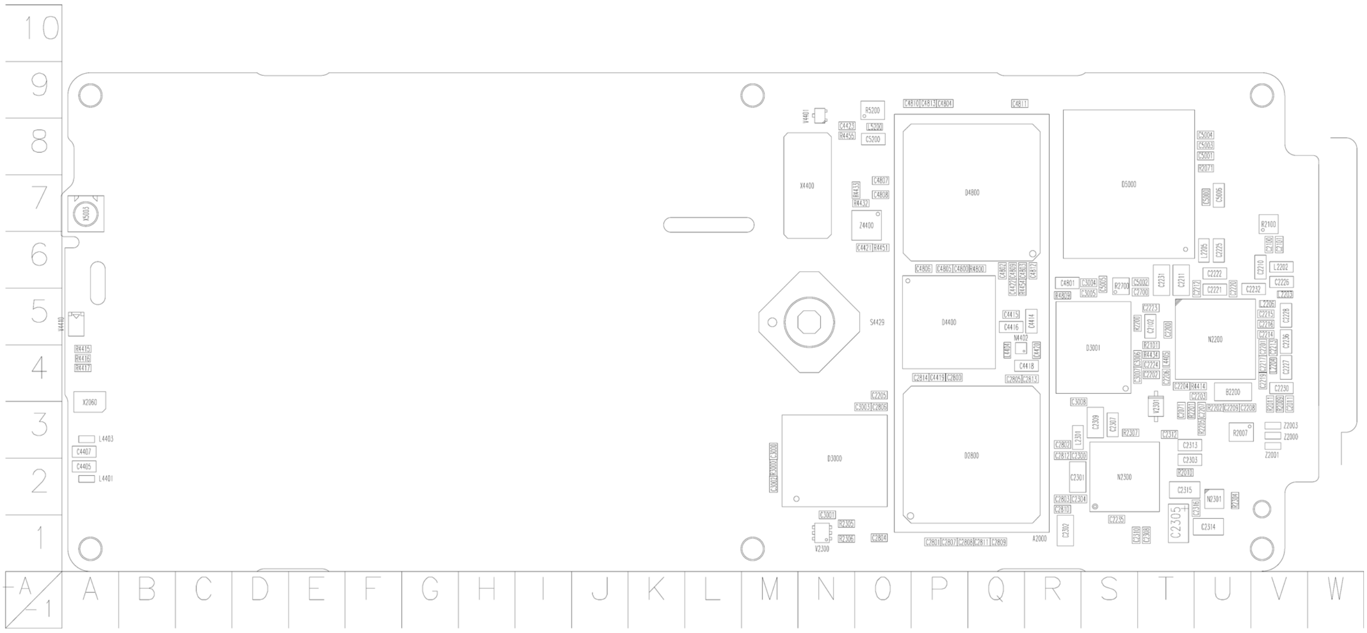
A

Figure 2 Bottom 1jq-17e

Component layout - top 1jq_17e


10
9
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7
6
5
4
3
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1
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Figure 3 Top 1jq-17e

3 — Service Software Instructions

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Phoenix installation steps in brief

Before you begin

Recommended hardware requirements:

- Computer processor: Pentium 700 MHz or higher
- RAM 256 MB
- Disk space 100-300 MB

Supported operating systems:

- *Windows 2000* Service Pack 3 or higher
- *Windows XP* Service Pack 1 or higher

Context

Phoenix is a service software for reprogramming, testing and tuning phones.

Phoenix installation contains:

- Service software support for all phone models included in the package
- Flash update package files for programming devices
- All needed drivers for:
  - PKD-1 (DK2) dongle
  - DKU-2 USB cable

Note: Separate installation packages for flash update files and drivers are also available, but it is not necessary to use them unless there are updates between *Phoenix* service software releases. If separate update packages are used, they should be used after *Phoenix* and data packages have been installed.

The phone model specific data package includes all changing product specific data:

- Product software binary files
- Files for type label printing
- Validation file for the faultlog repair data reporting system
- All product specific configuration files for *Phoenix* software components

Note: *Phoenix* and phone data packages should only be used as complete installation packages. Uninstallation should be made from the *Windows* Control Panel.

To use *Phoenix*, you need to:

Steps

1. Connect a PKD-1 (DK2) dongle to the computer parallel port.
2. Install *Phoenix*.
3. Install the phone-specific data package.
4. Configure users.
5. Manage connection settings (depends on the tools you are using).
   - Update FPS-10 software

     Note: There is no need to activate FPS-10.
   - Activate SX-4 smart card, if you need tuning and testing functions.

     Note: When FPS-10 is used only for product software updates, SX-4 smart card is not needed.

Results

Phoenix is ready to be used with FPS-10 flash prommer and other service tools.

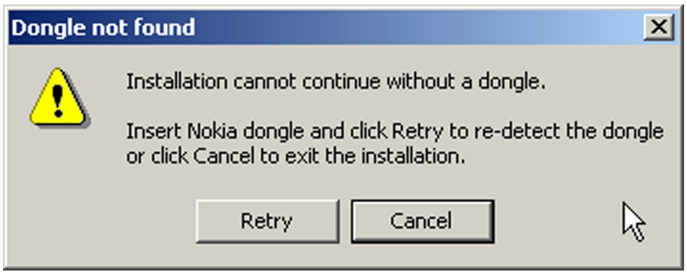
Installing *Phoenix*

Before you begin

- Check that a dongle is attached to the parallel port of your computer.
- Download the *Phoenix* installation package (for example, *phoenix_service_sw_2004_39_x_xx.exe*) to your computer (in *C:|TEMP*, for instance).
- Close all other programs.
- Depending on your operating system, administrator rights may be required to install *Phoenix*.
- If uninstalling or rebooting is needed at any point, you will be prompted by the InstallShield program.

Context

At some point during the installation procedure, you may get the following message:



Dongle not found

Installation cannot continue without a dongle.

Insert Nokia dongle and click Retry to re-detect the dongle or click Cancel to exit the installation.

Figure 4 Dongle not found

This may be a result of a defective or too old PKD-1 dongle.

Check the COM/parallel ports used. After correcting the problem, you can restart the installation.

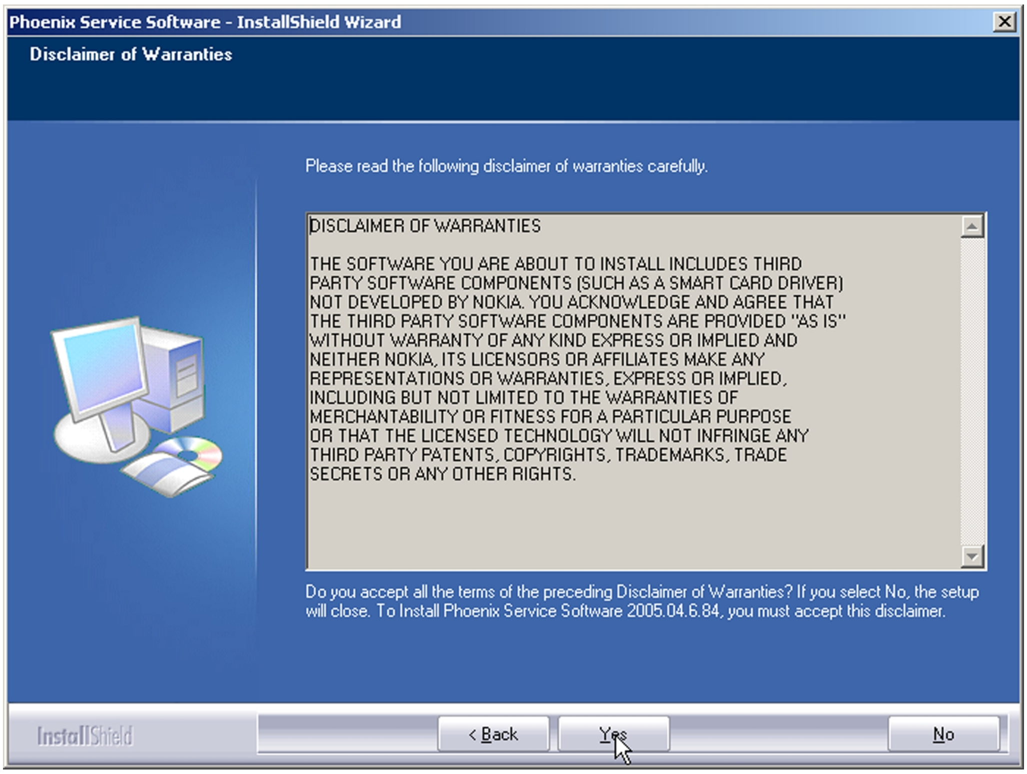
For more detailed information, please refer to *Phoenix* Help files.

> **Tip:** Each feature in *Phoenix* has its own Help function, which can be activated while running the program. Press the **F1** key or the feature’s **Help** button to activate a Help file.

Steps

1. To start the installation, run the application file (for example,*phoenix_service_sw_2004_39_x_xx.exe*).
2. In the *Welcome* dialogue, click **Next**.

3. Read the disclaimer text carefully and click **Yes**.



Phoenix Service Software - InstallShield Wizard

Disclaimer of Warranties

Please read the following disclaimer of warranties carefully.

DISCLAIMER OF WARRANTIES

THE SOFTWARE YOU ARE ABOUT TO INSTALL INCLUDES THIRD PARTY SOFTWARE COMPONENTS (SUCH AS A SMART CARD DRIVER) NOT DEVELOPED BY NOKIA. YOU ACKNOWLEDGE AND AGREE THAT THE THIRD PARTY SOFTWARE COMPONENTS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND EXPRESS OR IMPLIED AND NEITHER NOKIA, ITS LICENSORS OR AFFILIATES MAKE ANY REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR THAT THE LICENSED TECHNOLOGY WILL NOT INFRINGE ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADEMARKS, TRADE SECRETS OR ANY OTHER RIGHTS.

Do you accept all the terms of the preceding Disclaimer of Warranties? If you select No, the setup will close. To Install Phoenix Service Software 2005.04.6.84, you must accept this disclaimer.

Figure 5 Disclaimer text

4. Choose the destination folder.

   The default folder *C:|ProgramFiles|Nokia|Phoenix* is recommended.

5. To continue, click **Next.**

   To choose another location, click **Browse** (not recommended).

6. Wait for the components to be copied.

   The progress of the installation is shown in the *Setup Status* window.

7. Wait for the drivers to be installed and updated.

   The process may take several minutes to complete.

   If the operating system does not require rebooting, the PC components are registered right away.

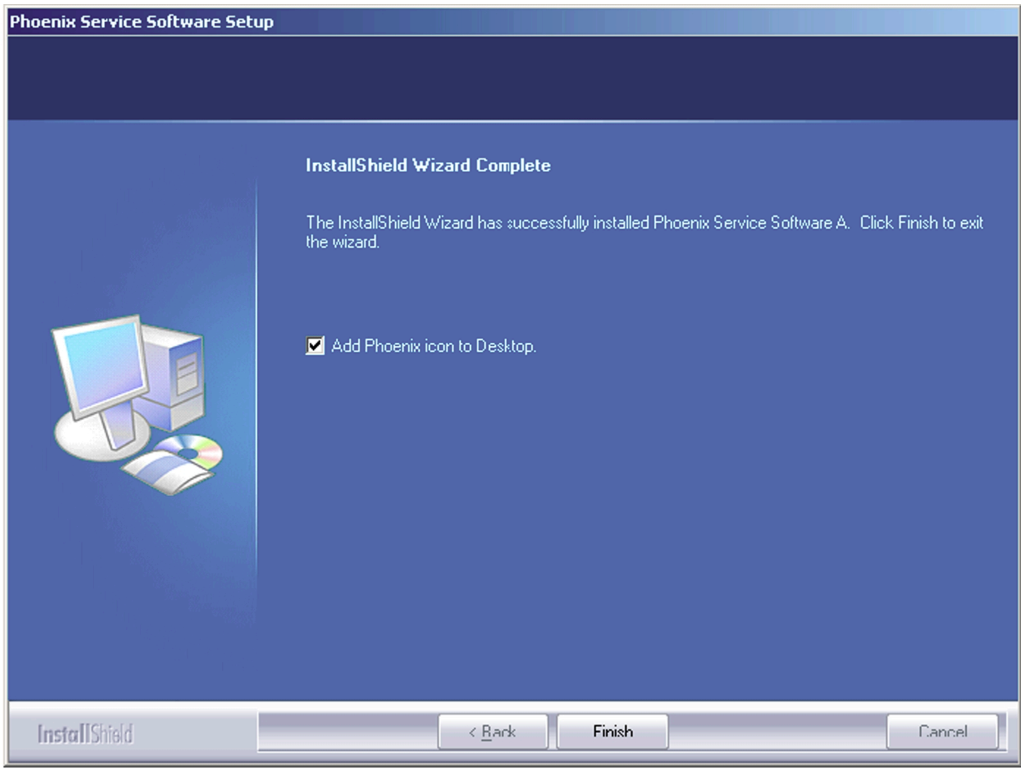
   If the operating system requires restarting your computer, the Install Shield Wizard will notifies about it.

   Select **Yes...** to reboot the PC immediately or **No...** to reboot the PC manually afterwards.

   After the reboot, all components are registered.

   Note: *Phoenix* does not work, if the components have not been registered.

8. To end the installation, click **Finish**.



InstallShield Wizard Complete

The InstallShield Wizard has successfully installed Phoenix Service Software A. Click Finish to exit the wizard.

☑ Add Phoenix icon to Desktop.

Figure 6 InstallShield Wizard Complete

Next action

After the installation, *Phoenix* can be used after:

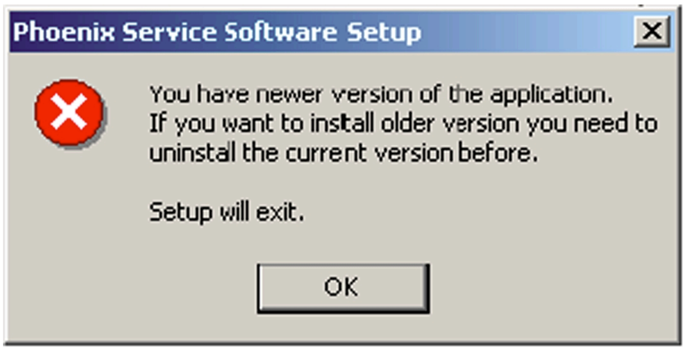
- installing phone model specific data package for *Phoenix*
- configuring users and connections

FPS-10 flash prommer can be used after updating their flash update package files.

Updating *Phoenix* installation

Context

- If you already have the *Phoenix* service software installed on your computer, you need to update the software when new versions are released.
- To update *Phoenix*, you need to follow the same steps as when installing it for the first time.
- When you are updating, for example, from version **a14_2004_16_4_47** to **a15_2004_24_7_55**, the update will take place automatically without uninstallation.
- Always use the latest available versions of both *Phoenix* and the phone-specific data package. Instructions can be found in the phone model specific Technical Bulletins and phone data package *readme.txt* files (shown during installation).
- If you try to update *Phoenix* with the same version you already have (for example, **a15_2004_24_7_55** to **a15_2004_24_7_55**), you are asked if you want to uninstall the existing version. In this case you can choose between a total uninstallation or a repair installation in a similar way when choosing to uninstall the application from the *Windows* Control Panel.
- If you try to install an older version (for example, downgrade from **a15_2004_24_7_55** to **a14_2004_16_4_47**), installation will be interrupted.



Phoenix Service Software Setup

You have newer version of the application.
If you want to install older version you need to uninstall the current version before.

Setup will exit.

Figure 7 Installation interrupted

- Always follow the instructions on the screen.

Steps

1. Download the installation package to your computer hard disk.
2. Close all other programs.
3. Run the application file (for example, *phoenix_service_sw_2004_39_x_xx.exe*).

Results

A new *Phoenix* version is installed and driver versions are checked and updated.

Uninstalling *Phoenix*

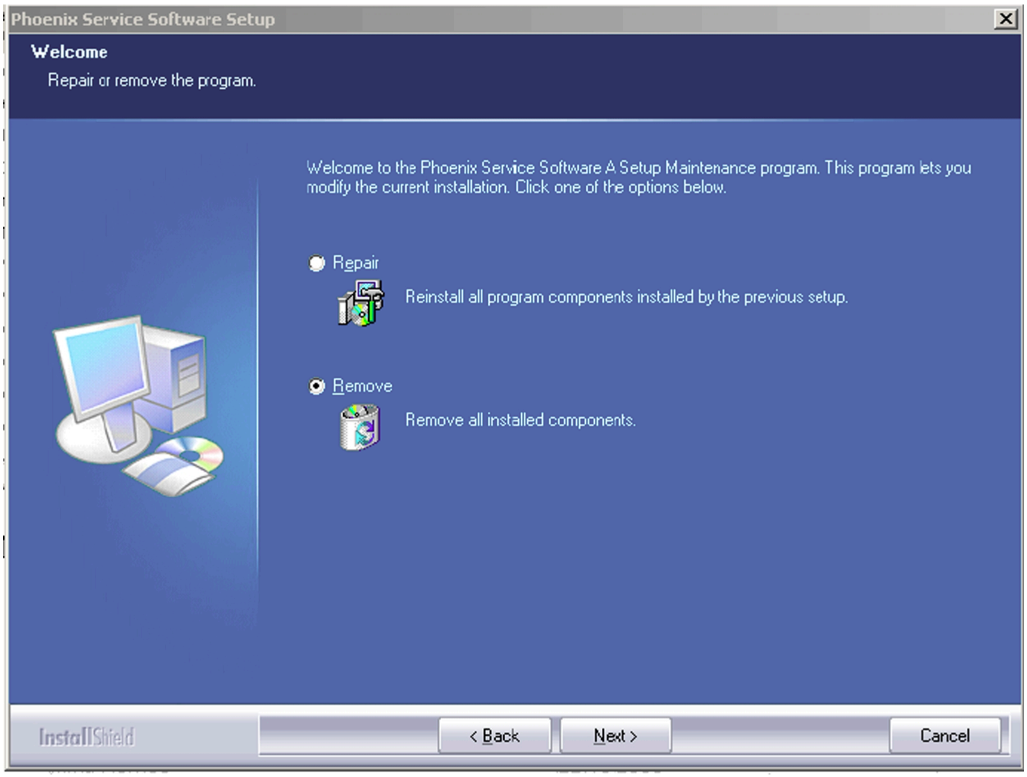
Context

You can uninstall *Phoenix* service software manually from the *Windows* Control Panel.

Steps

1. Open the **Windows Control Panel**, and choose **Add/Remove Programs**.

2. To uninstall *Phoenix*, choose **Phoenix Service Software→Change/Remove→Remove** .


Phoenix Service Software Setup
InstallShield
< Back
Next >
Cancel

Welcome

Repair or remove the program.

Welcome to the Phoenix Service Software A Setup Maintenance program. This program lets you modify the current installation. Click one of the options below.

○ Repair

Reinstall all program components installed by the previous setup.

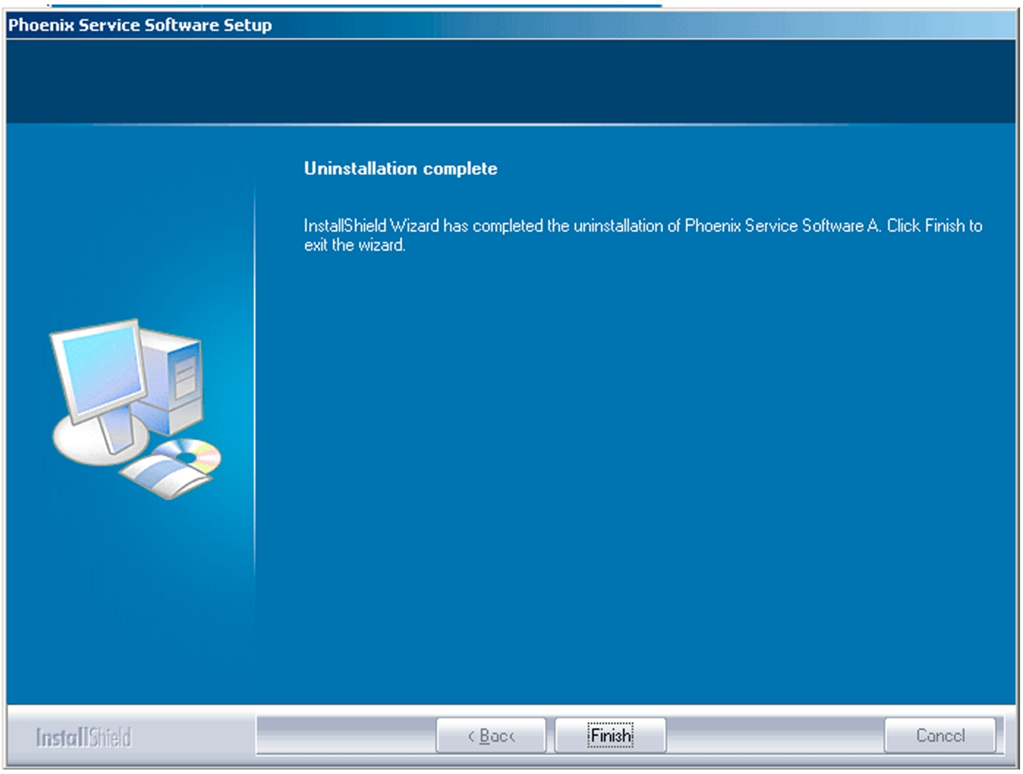
● Remove

Remove all installed components.

Figure 8 Remove program

The progress of the uninstallation is shown.

3. If the operating system does not require rebooting, click **Finish** to complete.


Phoenix Service Software Setup
InstallShield
< Back
Finish
Cancel

Uninstallation complete

InstallShield Wizard has completed the uninstallation of Phoenix Service Software A. Click Finish to exit the wizard.

Figure 9 Finish uninstallation

If the operating system requires rebooting, InstallShield Wizard will notify you. Select **Yes...** to reboot the PC immediately and **No...** to reboot the PC manually afterwards.

Repairing *Phoenix* installation

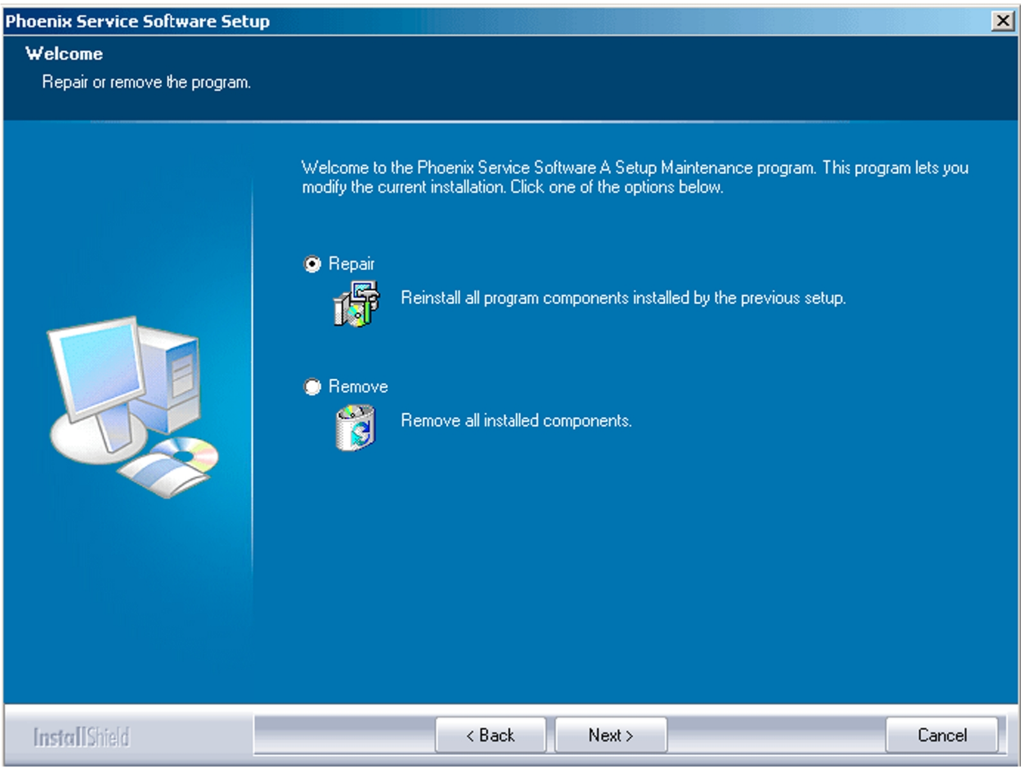
Context

If you experience any problems with the service software or suspect that files have been lost, use the repair function before completely reinstalling *Phoenix*.

> **Note:** The original installation package (for example, *phoenix_service_sw_a15_2004_24_7_55.exe*) must be found on your PC when you run the repair setup.

Steps

1. Open **Windows Control Panel→Add/Remove Programs** .
2. Choose **Phoenix Service Software→Change/Remove** .
3. In the following view, select **Repair**.



Phoenix Service Software Setup

Welcome

Repair or remove the program.

Welcome to the Phoenix Service Software A Setup Maintenance program. This program lets you modify the current installation. Click one of the options below.

● Repair

Reinstall all program components installed by the previous setup.

○ Remove

Remove all installed components.

Figure 10 Repair program

Phoenix reinstalls components and registers them.

The procedure is the same as when updating *Phoenix*.

4. To complete the repair, click **Finish**.

Phone data package overview

Each product has its own data package (DP). The product data package contains all product-specific data files to make the Phoenix service software and tools usable with a certain phone model.

The phone data package contains the following:

- Product software binary files

- Files for type label printing
- Validation file for the fault log repair data reporting system
- All product-specific configuration files for Phoenix software components

Data files are stored in **C:\Program Files\Nokia\Phoenix** (default).

Installing phone data package

Before you begin

- A phone-specific data package contains all data required for the *Phoenix* service software and service tools to be used with a certain phone model.
- Check that a dongle is attached to the parallel port of your computer.
- Install *Phoenix* service software.
- Download the installation package (for example, *XX-XX_dp_EA_v_1_0.exe*) to your computer (for example, in C:\TEMP).
- Close all other programs.

(XX-XX = type designator of the product)

If you already have *Phoenix* installed on your computer, you will need to update it when a new version is released.

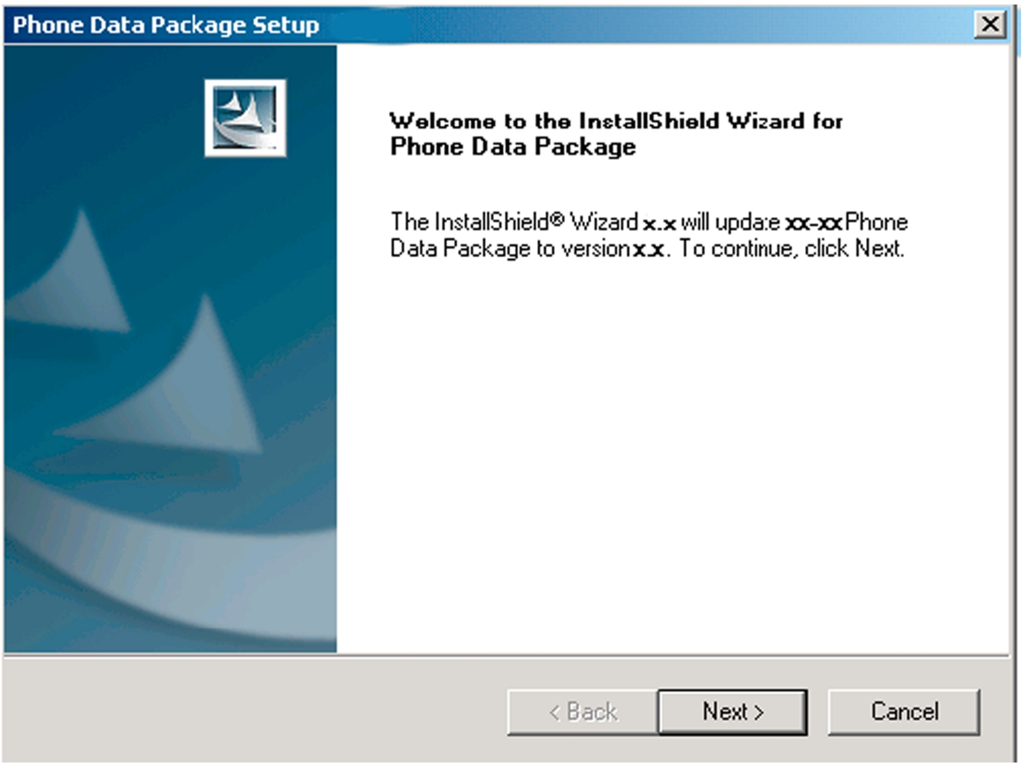
> **Note:** Often *Phoenix* and the phone-specific data package come in pairs, meaning that a certain version of *Phoenix* can only be used with a certain version of a data package. Always use the latest available versions of both. Instructions can be found in phone-specific Technical Bulletins and *readme.txt* files of data packages.

Steps

1. To start the installation, run the application file (for example, *XX-XX_dp_EA_ v_1_0.exe*),

   Wait for the installation files to be extracted.

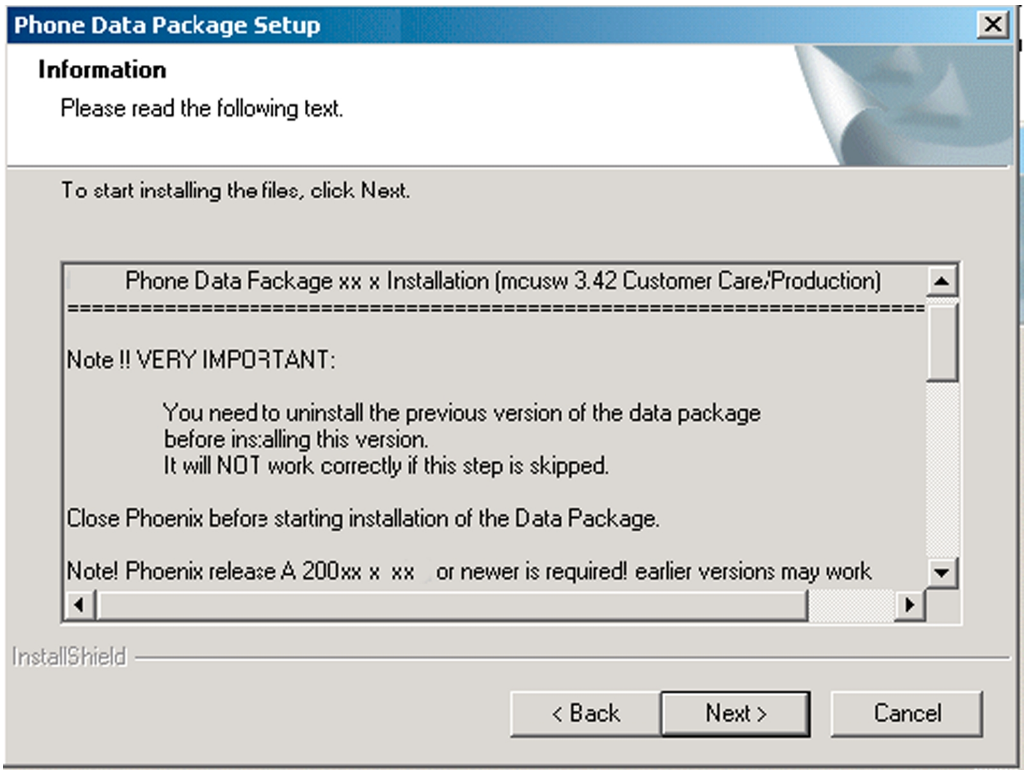
2. Click **Next**.



Welcome to the InstallShield Wizard for Phone Data Package

The InstallShield® Wizard **x.x** will update **xx-xx** Phone Data Package to version **x.x**. To continue, click Next.

3. In the following view you can see the contents of the data package. Read the text carefully. There is information about the *Phoenix* version required with this data package.



Information

Please read the following text.

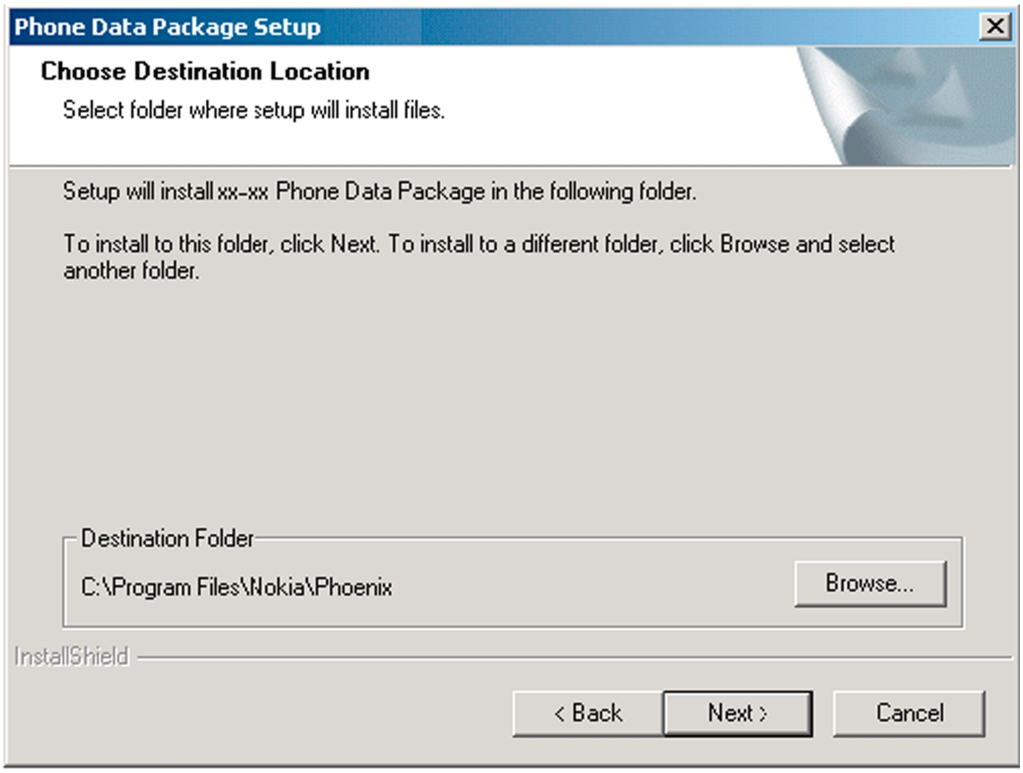
To start installing the files, click Next.

```
     Phone Data Package xx x Installation (mcusw 3.42 Customer Care/Production)
===========================================================================

Note !! VERY IMPORTANT:

          You need to uninstall the previous version of the data package
          before installing this version.
          It will NOT work correctly if this step is skipped.

Close Phoenix before starting installation of the Data Package.

Note! Phoenix release A 200xx x  xx   or newer is required! earlier versions may work
```

Figure 11 Data package setup information

4. To continue, click **Next**.

5. Choose the destination folder, and click **Next** to continue.



Phone Data Package Setup

Choose Destination Location

Select folder where setup will install files.

Setup will install xx-xx Phone Data Package in the following folder.

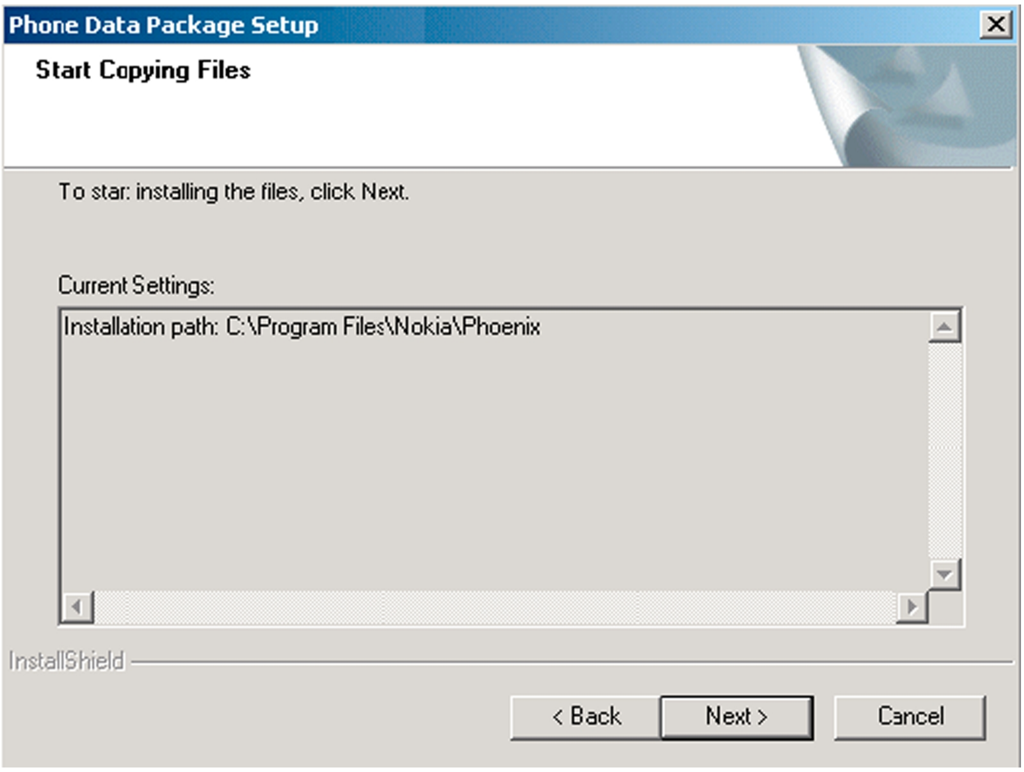
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.

Destination Folder: C:\Program Files\Nokia\Phoenix

Figure 12 Data package destination folder

The InstallShield Wizard checks where *Phoenix* is installed, and the directory is shown.

6. To start copying the files, click **Next**.



Phone Data Package Setup

Start Copying Files

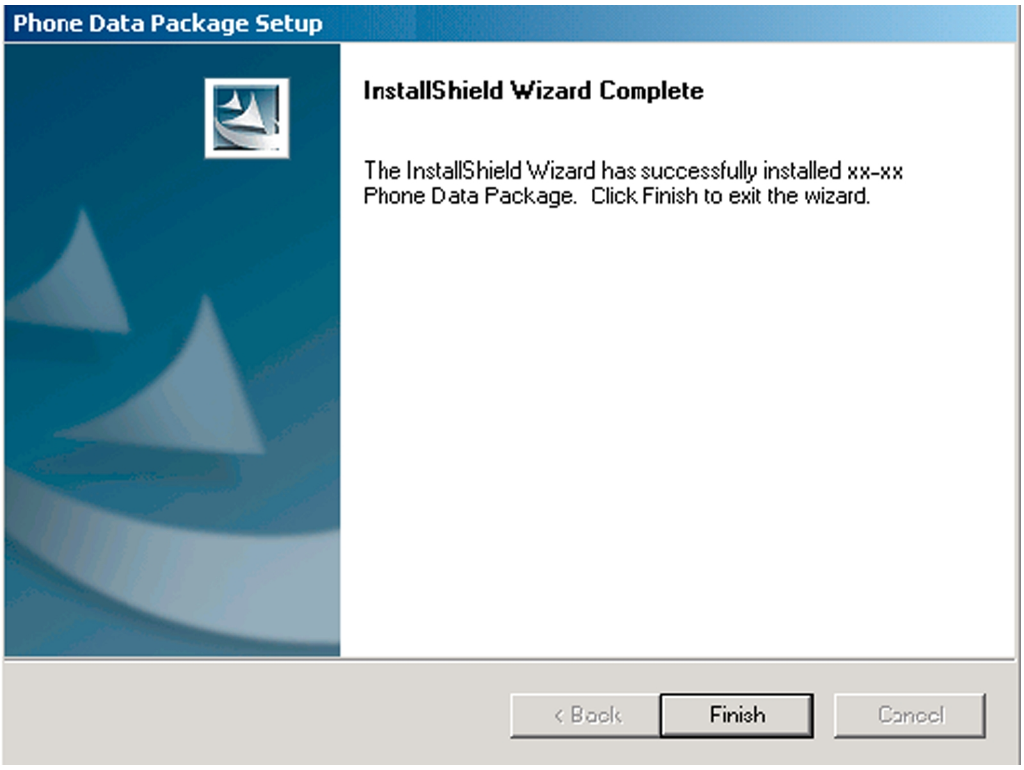
To start installing the files, click Next.

Current Settings:

Installation path: C:\Program Files\Nokia\Phoenix

Phone model specific files are installed. Please wait.

7. To complete the installation, click **Finish**.



InstallShield Wizard Complete

The InstallShield Wizard has successfully installed xx-xx Phone Data Package. Click Finish to exit the wizard.

Figure 13 InstallShield Wizard Complete

Next action

Phoenix can be used for flashing phones and printing type labels after:

- Configuring users
- Managing connections

FPS-10 can be used after updating their flash update package files.

Uninstalling phone data package

Context

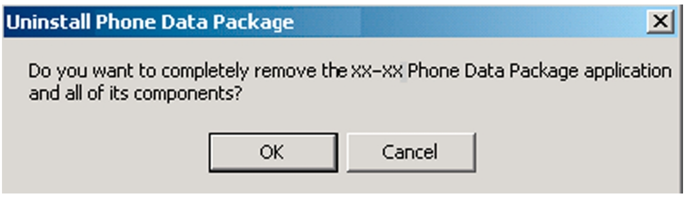
There is no need to uninstall an older version of a data package, unless instructions to do so are given in the *readme.txt* file of the data package and bulletins related to the release.

Please read all related documents carefully.

Steps

1. Locate the data package installation file (e.g. *XX-XX_dp_EA_v_1_0.exe*) from your computer.
2. To start the uninstallation procedure, double-click the data package installation file.

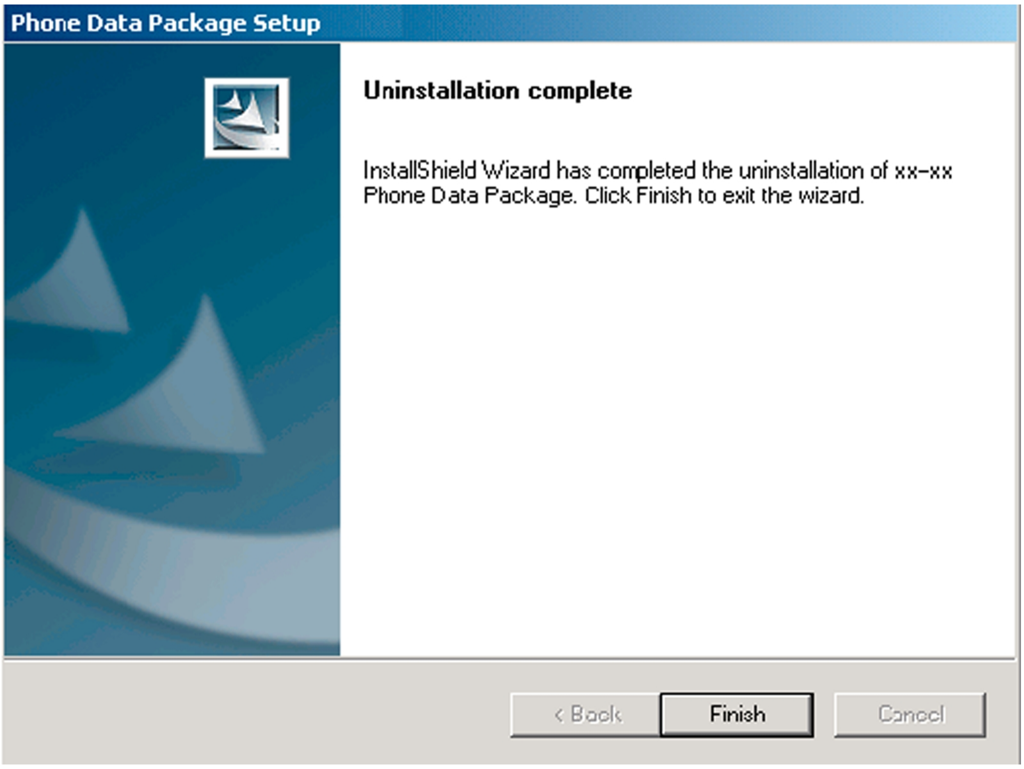
3. To uninstall the data package, click **OK** or to interrupt the uninstallation, click **Cancel**.


Uninstall Phone Data Package

Do you want to completely remove the xx-xx Phone Data Package application and all of its components?

Figure 14 Uninstalling phone data package

4. When the data package is uninstalled, click **Finish**.


Phone Data Package Setup

Uninstallation complete

InstallShield Wizard has completed the uninstallation of xx-xx Phone Data Package. Click Finish to exit the wizard.

Figure 15 Finishing data package uninstallation

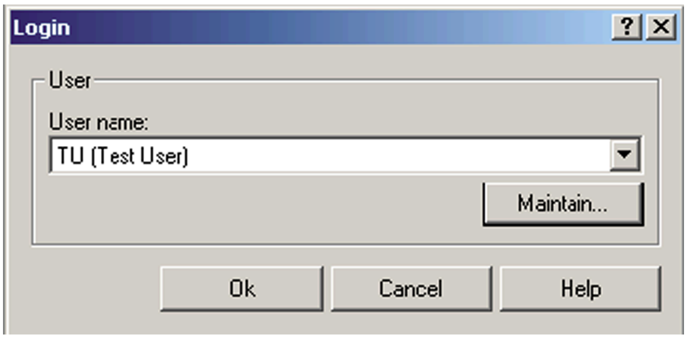
Alternative steps

- You can also uninstall the data package manually from **Control Panel→Add/Remove Programs→xx-xx* Phone Data Package** . (*= type designator of the phone).

Configuring users in *Phoenix*

Steps

1. Start *Phoenix* service software, and log in.



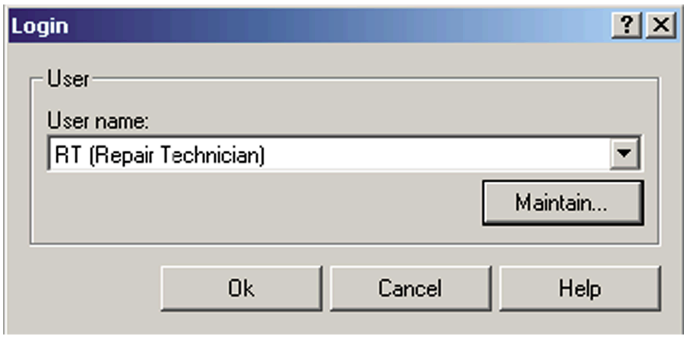
User name: TU (Test User)

Figure 16 Phoenix login

If the user ID is already configured, select s/he from the *User name* drop-down list, and click **OK**.

2. To add a new user, or to edit existing ones, click **Maintain**.
3. To add a new user, click **New**.
4. Type in the name and initials of the user, and click **OK**.

   The user is added to the user name list.
5. Select the desired user from the *User name* drop-down list, and click **OK**.



User name: RT (Repair Technician)

Figure 17 New user configured

Managing connections in *Phoenix*

Context

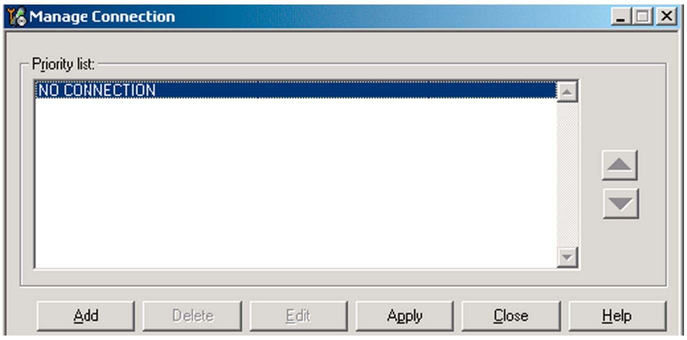
With the **Manage Connections** feature you can edit and delete existing connections or create new ones.

> **Note:** After choosing the desired connection, and connecting the phone to a PC for the first time, allow the PC to install the USB device drivers first. Please note that this may take some time to complete.
>
> If there are problems after the driver installation, check that the USB connection is active from the **Windows Control Panel**. If the problem persists, contact the local PC support.

Steps

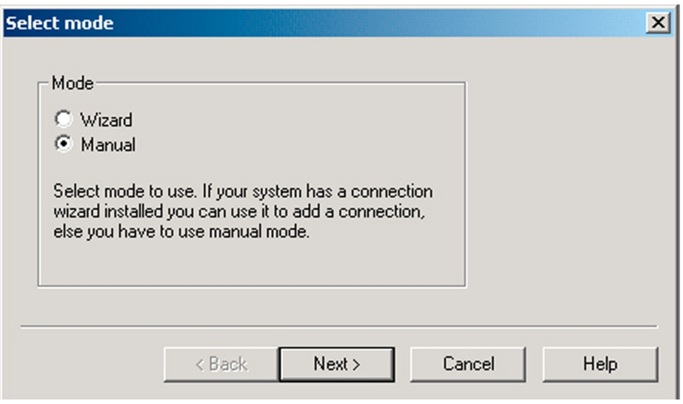
1. Start *Phoenix*, and log in.
2. Choose **File→Manage Connections...** .

3. To add a new connection, click **Add**.



4. Select **Manual** mode, and click **Next** to continue.

   If you want to create the connection using the Connection Wizard, connect the tools and a phone to your PC. The wizard will automatically try to configure the correct connection.



○ Wizard
● Manual

Select mode to use. If your system has a connection wizard installed you can use it to add a connection, else you have to use manual mode.

Figure 18 Select mode: Manual

i For an FPS-10 flash prommer with a **USB Connection**, choose the following connection settings:
   - Media: **FPS-10 USB**
   - DEVICE_INDEX: **0**
   - SERIAL_NUM: See Serial No from the label attached to the bottom of FPS-10
   - ACTIVE_MEDIA: **USB**

ii For an FPS-10 flash prommer with a **LAN connection**, choose the following connection settings:
   - Media: **FPS-10 TCP/IP**
   - NET_SERV_NAME: Click **Scan...**. Choose your own FPS-10 device based on the correct MAC address. See Serial No from the label attached to the bottom of your FPS-10.
   - PORT_NUM: Use the default value, and click **Next**.
   - PROTOCOL_FAMILY: Use the default value, and click **Next**.
   - SOCKET TYPE: Use the default value, and click **Next**.
   - TX_BUFFER_SIZE: Use the default value, and click **Next**.
   - RX_BUFFER_SIZE: Use the default value, and click **Next**.

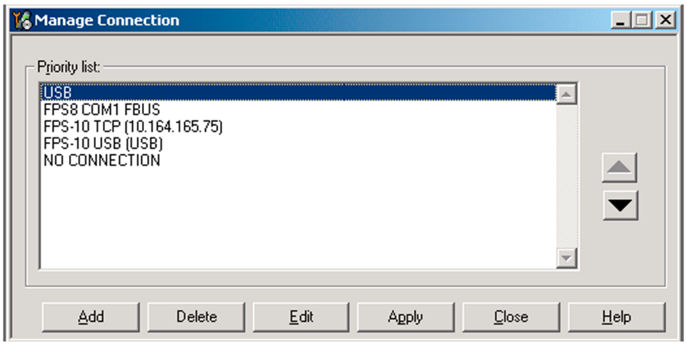
iii For an FPS-8 flash prommer, choose the following connection settings:
   - Media: FPS-8
   - PORT_NUM: COM Port where FPS-8 is connected
   - COMBOX_DEF_MEDIA: **FBUS**

iv For a plain **USB connection**, choose the following connection settings:

Note: First connect the DKU-2 USB cable between the PC USB port and phone.

- Media: USB

5. To complete the configuration, click **Finish**.
6. Click the connection you want to activate. Use the up/down arrows located on the right hand side to move it on top of the list, then click **Apply**.



USB
FPS8 COM1 FBUS
FPS-10 TCP (10.164.165.75)
FPS-10 USB (USB)
NO CONNECTION

Figure 19 Connections list

The connection is activated, and it can be used after closing the *Manage Connection* window.

The connection information is shown at the right hand bottom corner of the screen.

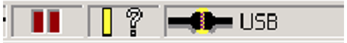
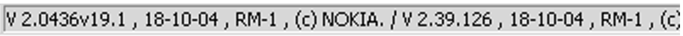


Figure 20 Connection information

7. To use the connection, connect the phone to your PC with correct service tools. Make sure the phone is switched on, and then choose **File→Scan Product** .

Results

The product support module information appears in the status bar:



V 2.0436v19.1 , 18-10-04 , RM-1 , (c) NOKIA. / V 2.39.126 , 18-10-04 , RM-1 , (c)

Figure 21 Product support module information (example from RM-1)

Installing flash support files for FPS-10

Before you begin

Note: You need to install flash support files for FPS-10 only, if you don't have the latest Phoenix available or the flash support files have changed after the latest Phoenix release.

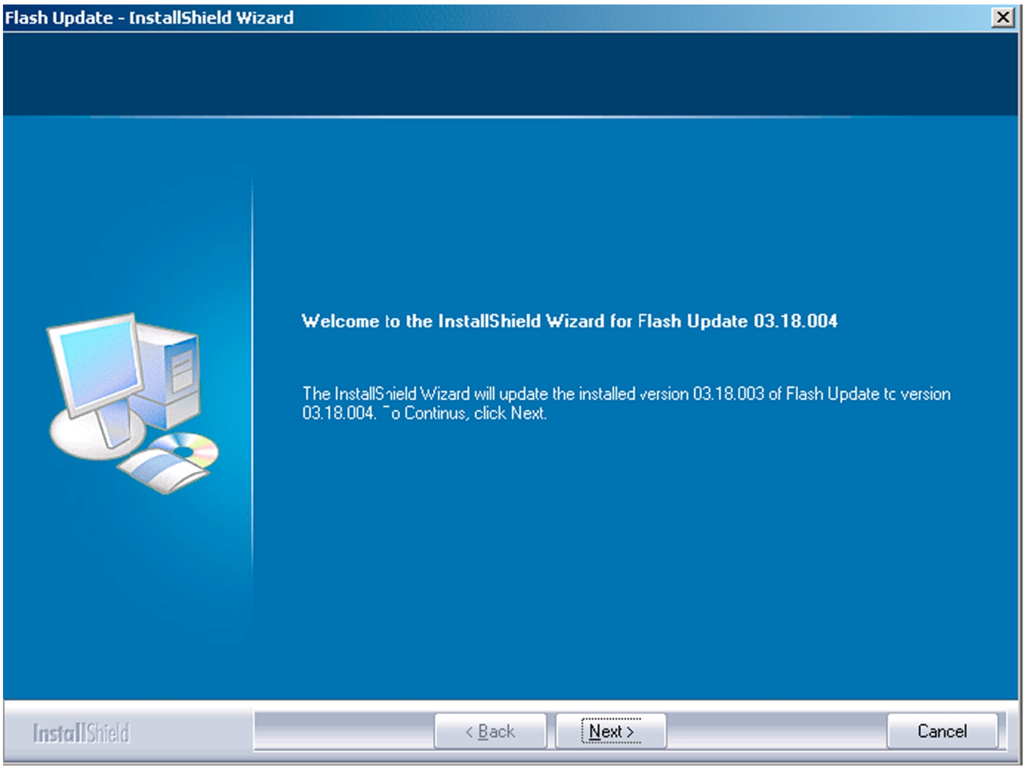
- Flash support files are installed automatically, when you install Phoenix. Use Phoenix packages later than June 2005.
- Normally it is enough to install Phoenix and the phone-specific data package because the Phoenix installation always includes the latest flash update package files for FPS-10.
- A separate installation package for flash support files is available, and the files can be updated according to this instruction, if updates appear between new Phoenix / data package releases

Context

If you are not using a separate installation package, you can skip this section and continue with "Updating FPS-10 flash prommer software" (page 3–22) after installing a new phone data package.

Steps

1. To begin installation, double- click *flash_update_x_yy.exe* .



Flash Update - InstallShield Wizard

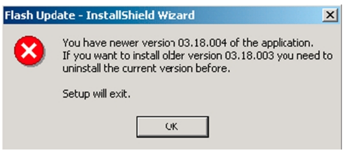
Welcome to the InstallShield Wizard for Flash Update 03.18.004

The InstallShield Wizard will update the installed version 03.18.003 of Flash Update to version 03.18.004. To Continue, click Next.

Figure 22 Flash update welcome dialog

If the same version of Flash Update package already exists, and you want to reinstall it, the previous package is first uninstalled. Restart installation again after that.

2. If you try to downgrade the existing version to older ones, the setup will be aborted. If you really want to downgrade, uninstall newer files manually from **Control Panel** and then rerun the installation again.



Flash Update - InstallShield Wizard

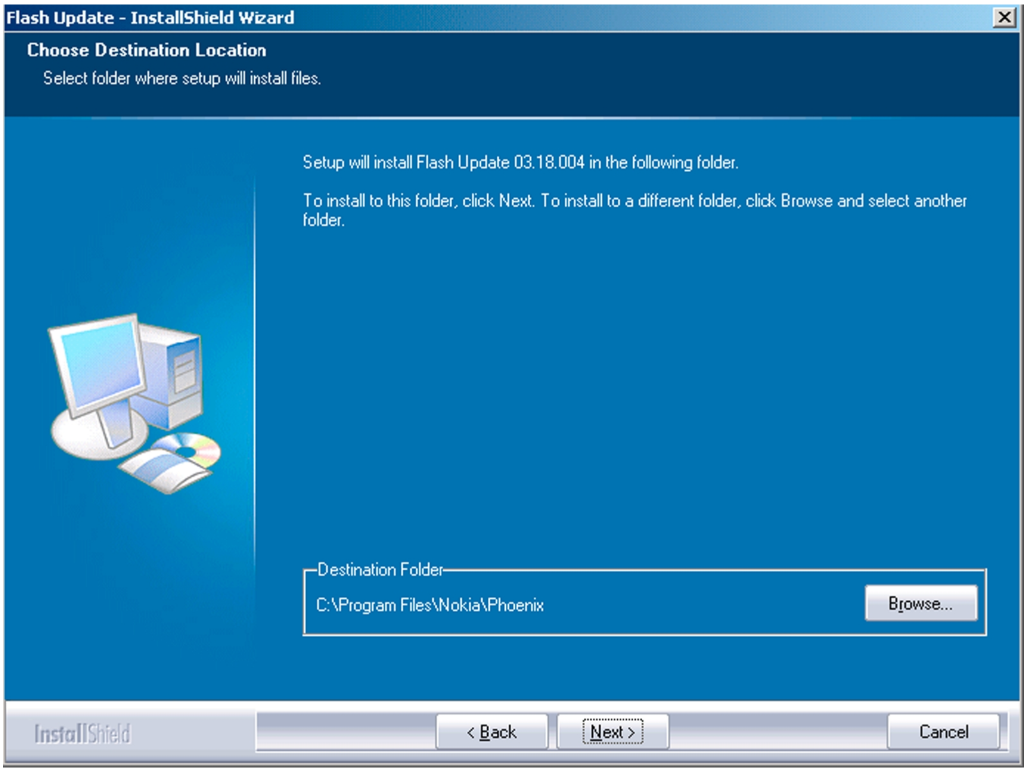
You have newer version 03.18.004 of the application.
If you want to install older version 03.18.003 you need to uninstall the current version before.

Setup will exit.

Figure 23 Flash installation interrupted

If an older version exists on your PC and it needs to be updated, click **Next** to continue installation.

3. It is highly recommended to install the files to the default destination folder *C:|Program Files|Nokia |Phoenix*. Click **Next** to continue.


Flash Update - InstallShield Wizard

Choose Destination Location

Select folder where setup will install files.

Setup will install Flash Update 03.18.004 in the following folder.

To install to this folder, click Next. To install to a different folder, click Browse and select another folder.

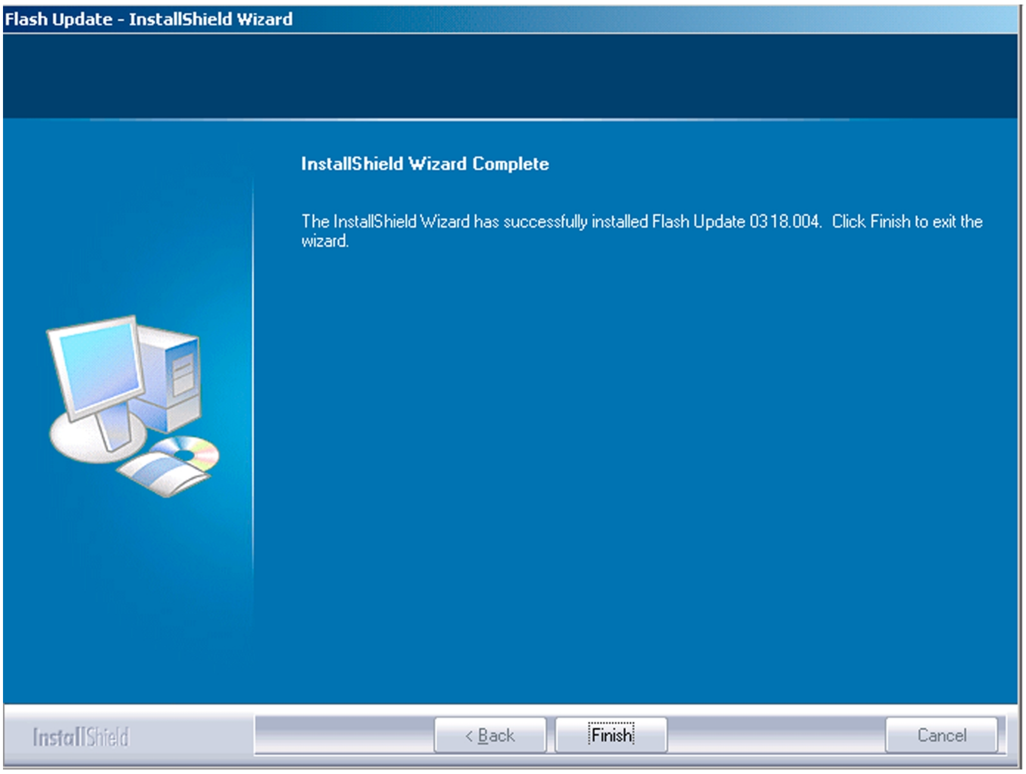
Destination Folder

C:\Program Files\Nokia\Phoenix

Figure 24 Flash destination folder

When installing the flash update files for the first time you may choose another location by selecting **Browse**. However, this is not recommended.

4. To complete the installation procedure, click **Finish** .


Flash Update - InstallShield Wizard
InstallShield
< Back
Finish
Cancel

InstallShield Wizard Complete

The InstallShield Wizard has successfully installed Flash Update 0318.004. Click Finish to exit the wizard.

Figure 25 Finish flash update

Next action

FPS-10 flash prommers must be updated using Phoenix!

Updating FPS-10 flash prommer software

Steps

1. Start *Phoenix Service Software* and log in, manage connection correctly for your flash prommer.
2. Choose **Flashing→Prommer maintenance** .

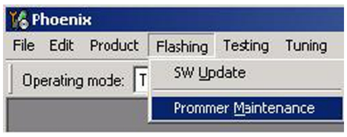
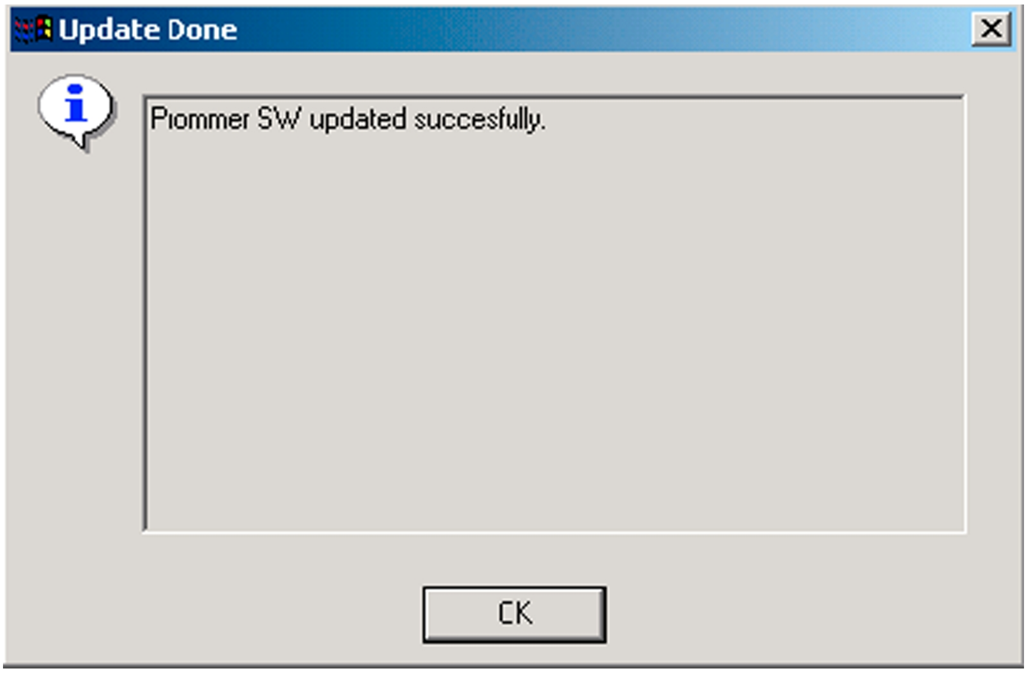

Phoenix
File
Edit
Product
Flashing
Testing
Tuning
Operating mode:
SW Update
Prommer Maintenance

Figure 26 Choosing Prommer maintenance

3. When the new flash update package is installed to the computer you will be asked to update the files to your Prommer. To update the files, click **Yes**. Click **OK** if the computer informs you about an unsafe removal of the device.
4. Alternatively you can update the FPS-10 flash prommer software by clicking the **Update** button.

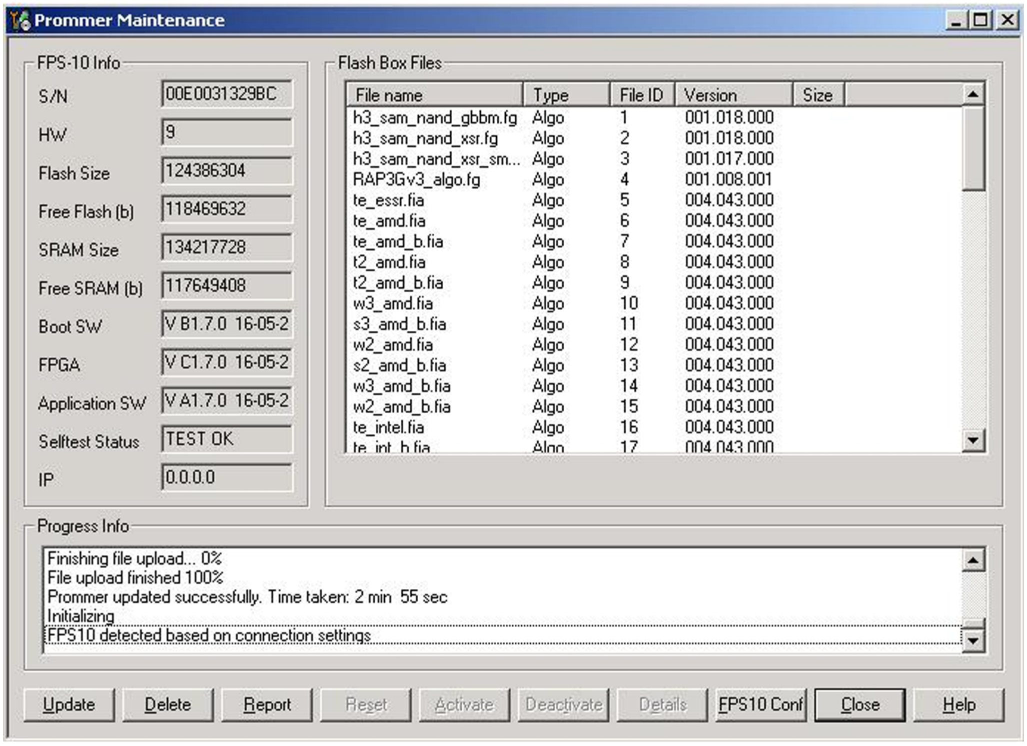
5. Wait until you are notified that update has been successful; the procedure will take a couple of minutes. Click **OK** to close the *Update Done* window.



Prommer SW updated succesfully.

Figure 27 Prommer SW update finished

6. If you are using the FPS-10 flash prommer, check that it is detected from the progress info. Check also the status leds in the FPS-10. The MODE2 led (green), VBAT and POWER leds (red) should be lit. If you are using LAN connection, the LAN led (yellow) should be blinking.
7. Check that your FPS-10 flash prommer has enough memory. Flashing the SU-18 with FPS-10 needs at least 128 MB of SRAM memory in the prommer.



S/N 00E0031329BC
HW 9
Flash Size 124386304
Free Flash (b) 118469632
SRAM Size 134217728
Free SRAM (b) 117649408
Boot SW V B1.7.0 16-05-2
FPGA V C1.7.0 16-05-2
Application SW V A1.7.0 16-05-2
Selftest Status TEST OK
IP 0.0.0.0

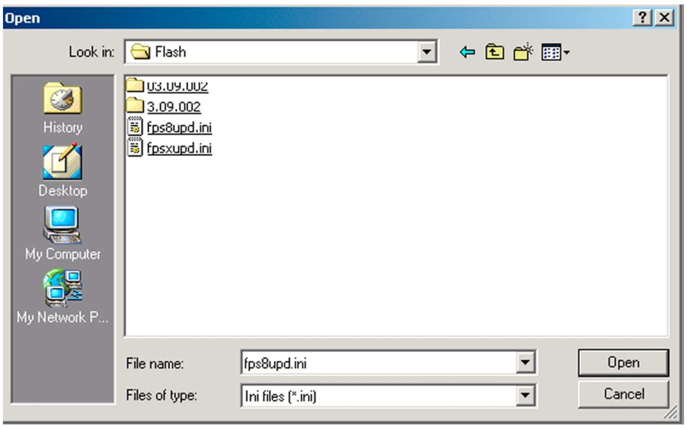
File name	Type	File ID	Version	Size
h3_sam_nand_gbbm.fg	Algo	1	001.018.000	
h3_sam_nand_xsr.fg	Algo	2	001.018.000	
h3_sam_nand_xsr_sm...	Algo	3	001.017.000	
RAP3Gv3_algo.fg	Algo	4	001.008.001	
te_essr.fia	Algo	5	004.043.000	
te_amd.fia	Algo	6	004.043.000	
te_amd_b.fia	Algo	7	004.043.000	
t2_amd.fia	Algo	8	004.043.000	
t2_amd_b.fia	Algo	9	004.043.000	
w3_amd.fia	Algo	10	004.043.000	
s3_amd_b.fia	Algo	11	004.043.000	
w2_amd.fia	Algo	12	004.043.000	
s2_amd_b.fia	Algo	13	004.043.000	
w3_amd_b.fia	Algo	14	004.043.000	
w2_amd_b.fia	Algo	15	004.043.000	
te_intel.fia	Algo	16	004.043.000	
te_int_b.fia	Algo	17	004.043.000	

```
Finishing file upload... 0%
File upload finished 100%
Prommer updated successfully. Time taken: 2 min  55 sec
Initializing
FPS10 detected based on connection settings
```

Figure 28 Prommer maintenance window

Alternative steps

- You can update FPS-10 SW by clicking the **Update** button and selecting the appropriate fpsxupd.ini file in *C:|Program Files|Nokia|Phoenix|Flash*.


Open
?
History
Desktop
My Computer
My Network P...
03.09.002
3.09.002
fps8upd.ini
fpsxupd.ini
Open
Cancel

Look in: Flash

File name: fps8upd.ini

Files of type: Ini files (*.ini)

Figure 29 Flash directory window

- All files can be loaded separately to the prommer used. To do this, click the right mouse button in the *Flash box files* window and select the file type to be loaded.

  More information can be found in Phoenix **Help**.

4 — Service Tools and Service Concepts

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Figure 36 LAN connection flash concept.....4–18

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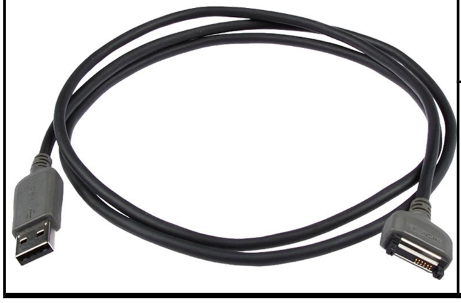
Service tools

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RM-49, refer to various concepts.

	CA-31D	USB cable	
	The CA-31D USB cable is used to connect FPS-10 or FPS-11 to a PC. It is included in the FPS-10 and FPS-11 sales packages.		
	CA-35S	Power cable	
	CA-35S is a power cable for connecting, for example, the FPS-10 flash prommer to the Point-Of-Sales (POS) flash adapter.		
	CA-53	USB connectivity cable	
	USB to system connector cable.		

CU-4	Control unit	

CU-4 is a general service tool used with a module jig and/or a flash adapter. It requires an external 12 V power supply.

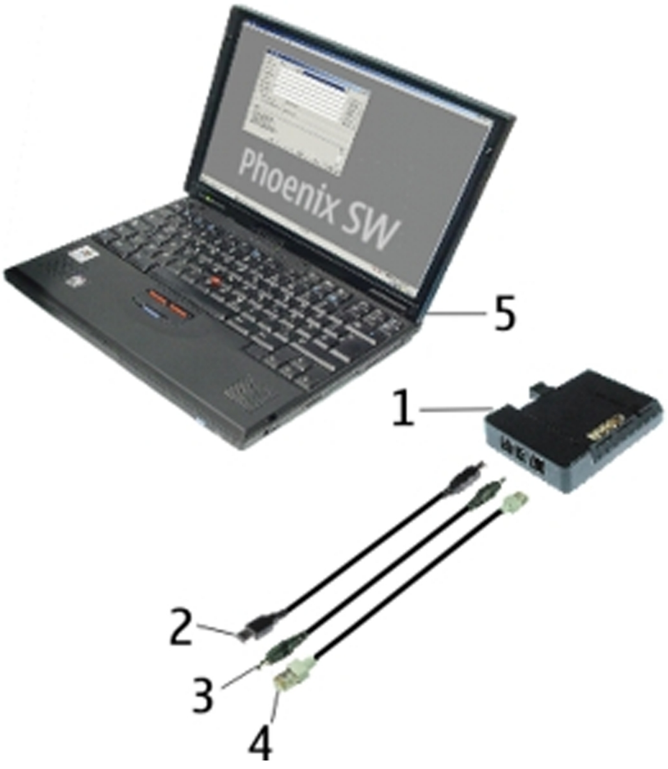
The unit has the following features:

- software controlled via USB
- EM calibration function
- Forwards FBUS/Flashbus traffic to/from terminal
- Forwards USB traffic to/from terminal
- software controlled BSI values
- regulated VBATT voltage
- 2 x USB2.0 connector (Hub)
- FBUS and USB connections supported

When using CU-4, note the special order of connecting cables and other service equipment:

Instructions

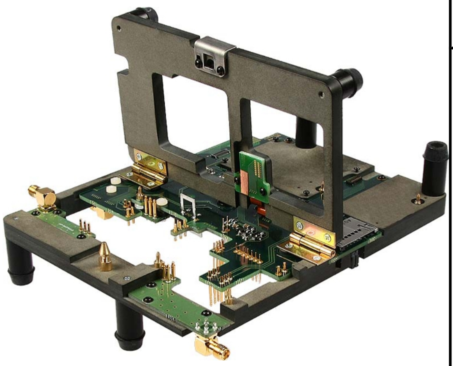
1 Connect a service tool (jig, flash adapter) to CU-4.
2 Connect CU-4 to your PC with a USB cable.
3 Connect supply voltage (12 V)
4 Connect an FBUS cable (if necessary).
5 Start Phoenix service software.

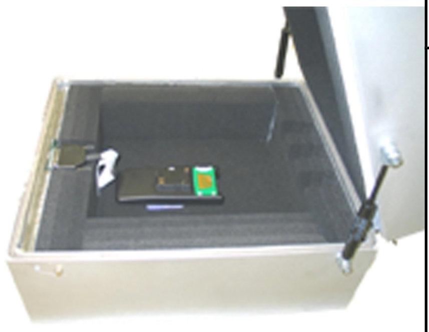


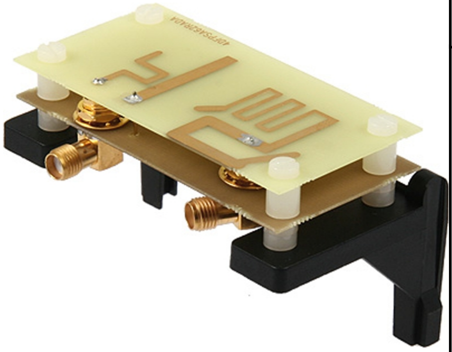
Note: Phoenix enables CU-4 regulators via USB when it is started.

Reconnecting the power supply requires a Phoenix restart.

<table>
<tr><td rowspan="2"> </td><td>FLS-5</td><td>Flash device</td><td></td></tr>
<tr><td colspan="3">FLS-5 is a dongle and flash device incorporated into one package, developed specifically for POS use.</td></tr>
<tr><td rowspan="2"> </td><td>FPS-10</td><td>Flash prommer</td><td></td></tr>
<tr><td colspan="3">FPS-10 interfaces with:
• PC
• Control unit
• Flash adapter
• Smart card
FPS-10 flash prommer features:
• Flash functionality for BB5 and DCT-4 terminals
• Smart Card reader for SX-2 or SX-4
• USB traffic forwarding
• USB to FBUS/Flashbus conversion
• LAN to FBUS/Flashbus and USB conversion
• Vusb output switchable by PC command
FPS-10 sales package includes:
• FPS-10 prommer
• Power Supply with 5 country specific cords
• USB cable</td></tr>
<tr><td rowspan="2"> </td><td>FS-11</td><td>Flash adapter</td><td></td></tr>
<tr><td colspan="3">FS-11 is a product specific adapter, compatible with SS-62 and SS-46. It provides galvanic connection to terminal test pads.</td></tr>
</table>

<table>
<tr><td rowspan="2"> </td><td>JBT-9</td><td>Bluetooth test and interface box (sales package)</td><td></td></tr>
<tr><td colspan="3">The JBT-9 test box is a generic service device used to perform Bluetooth bit error rate (BER) testing, and establishing cordless FBUS connection via Bluetooth. An ACP-8x charger is needed for BER testing and an AXS-4 cable in case of cordless interface usage testing .
Sales package includes:
• JBT-9 test box
• Installation and warranty information</td></tr>
<tr><td rowspan="2"></td><td>MJ-51</td><td>Module jig</td><td></td></tr>
<tr><td colspan="3">MJ-51 is meant for component level troubleshooting.
The jig includes an RF interface for GSM, WCDMA and Bluetooth. In addition, it has the following features:
• Provides mechanical interface with the engine module
• Provides galvanic connection to all needed test pads in module
• Multiplexing between USB and FBUS media, controlled by Vusb
• UI test interface
• MMC interface
• Duplicated SIM connector
• Audio components: IHF, MIC, earpiece
• Connector for control unit
• Access for Pop-Port^{TM} system connector
Note: In the picture CU-4 is connected to MJ-51 . CU-4 is not part of the MJ-51 sales package and has to be ordered separately.</td></tr>
<tr><td rowspan="2"> </td><td>PCS-1</td><td>Power cable</td><td></td></tr>
<tr><td colspan="3">The PCS-1 power cable (DC) is used with a docking station, a module jig or a control unit to supply a controlled operating voltage.</td></tr>
</table>

<table>
<tr><td rowspan="2"> </td><td>PKD-1</td><td>SW security device</td><td></td></tr>
<tr><td colspan="3">SW security device is a piece of hardware enabling the use of the service software when connected to the parallel (LPT) port of the PC.
Without the device, it is not possible to use the service software.
Printer or any such device can be connected to the PC through the device if needed.</td></tr>
<tr><td rowspan="2"></td><td></td><td>RF shield box</td><td></td></tr>
<tr><td colspan="3">Because the WCDMA network disturbs the RX side testing of the WCDMA phone and the Tx signal of the WCDMA phone can severely disturb the WCDMA network, a shield box is needed in all testing, tuning and fault finding which requires WCDMA RF signal.
The shield box is not an active device, it contains only passive filtering components for RF attenuation.</td></tr>
<tr><td rowspan="2"> </td><td>RJ-70</td><td>Soldering jig</td><td></td></tr>
<tr><td colspan="3">RJ-70 is a soldering jig used for soldering and as a rework jig for the engine module.</td></tr>
</table>



SA-62	RF coupler	

SA-62 is an RF coupler for WCDMA and GSM RF testing. It is used together with the product-specific flash adapter.

The following table shows attenuations from the antenna pads of the mobile terminal to the SMA connectors of SA-62:

1

System	**Channel**	**Tx (dB)**	**Rx (dB)**
	975	-2.3	-6.5
EGSM 900	38	-2.4	-7.4
	124	-3.4	-8.0
	512	-4.9	-4.7
GSM 1800	698	-4.9	-5.3
	885	-4.5	-6.6
	512	-5.1	-5.5
GSM 1900	661	-5.9	-7.1
	810	-5.6	-6.4
	9612 / 10562	-5.5	-6.0
WCDMA	9750 / 10700	-4.5	-6.6
	9888 / 10838	-5.1	-7.8

SRT-6	Opening tool	

<table>
<tr><td rowspan="2"> </td><td>SS-46</td><td>Interface adapter</td><td></td></tr>
<tr><td colspan="3">SS-46 acts as an interface adapter between the flash adapter and FPS-10.</td></tr>
<tr><td rowspan="2"> </td><td>SS-62</td><td>Generic flash adapter base for BB5</td><td></td></tr>
<tr><td colspan="3">• generic base for flash adapters and couplers
• SS-62 equipped with a clip interlock system
• provides standardised interface towards Control Unit
• provides RF connection using galvanic connector or coupler
• multiplexing between USB and FBUS media, controlled by VUSB</td></tr>
<tr><td rowspan="2"> </td><td>SX-4</td><td>Smart card</td><td></td></tr>
<tr><td colspan="3">SX-4 is a BB5 security device used to protect critical features in tuning and testing.
SX-4 is also needed together with FPS-10 when DCT-4 phones are flashed.</td></tr>
<tr><td rowspan="2"> </td><td>XCS-4</td><td>Modular cable</td><td></td></tr>
<tr><td colspan="3">XCS-4 is a shielded (one specially shielded conductor) modular cable for flashing and service purposes.</td></tr>
</table>

<table>
<tr><td rowspan="2"> </td><td>XRS-6</td><td>RF cable</td><td></td></tr>
<tr><td colspan="3">The RF cable is used to connect, for example, a module repair jig to the RF measurement equipment.
SMA to N-Connector approximately 610 mm.
Attenuation for:
• GSM850/900: 0.3+-0.1 dB
• GSM1800/1900: 0.5+-0.1 dB
• WLAN: 0.6+-0.1dB</td></tr>
</table>

Service concepts

Flash concept with FPS-10

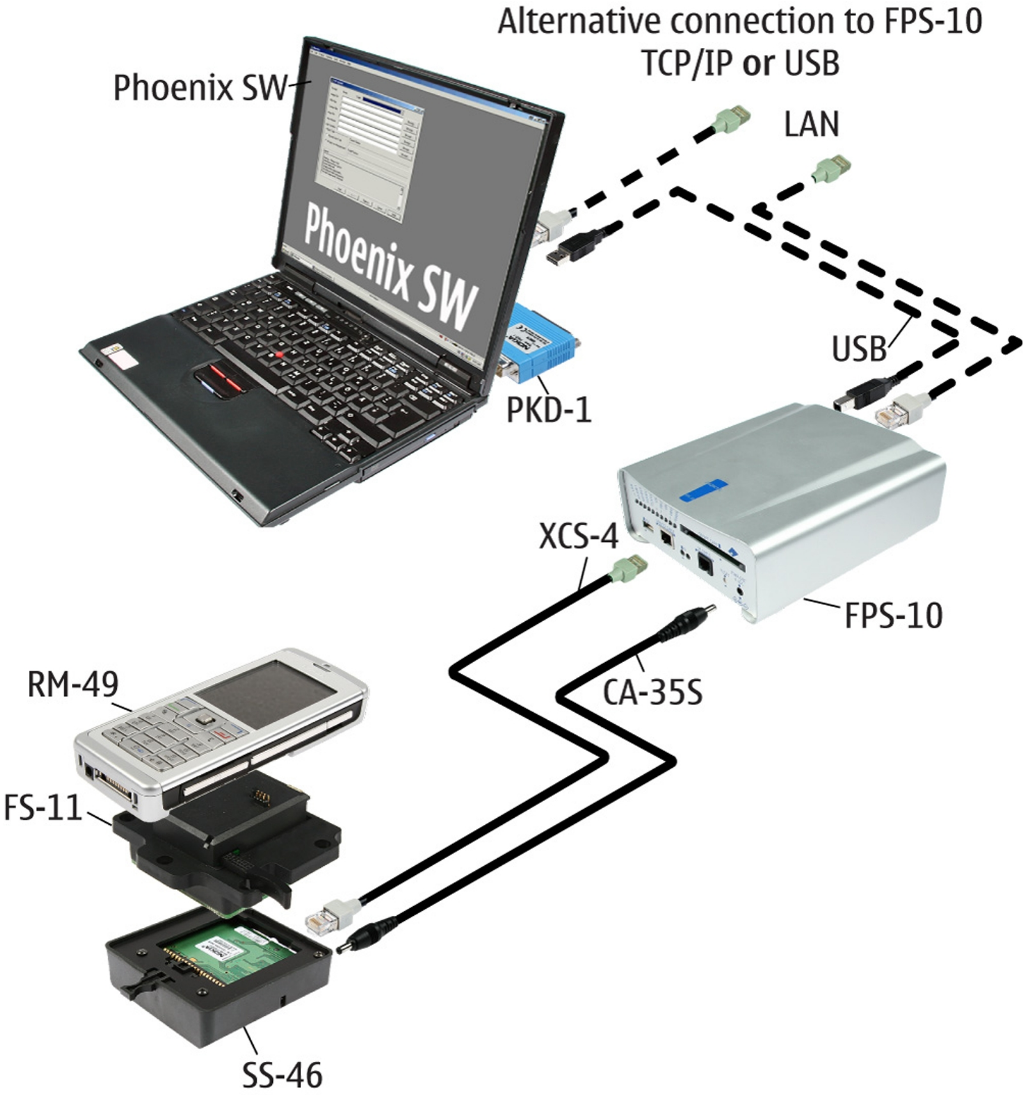

Alternative connection to FPS-10
TCP/IP or USB
Phoenix SW
Phoenix SW
LAN
USB
PKD-1
XCS-4
FPS-10
CA-35S
RM-49
FS-11
SS-46

Figure 30 Basic flash concept with FPS-10

Note: FPS-8 concept can also be used for flashing.

Description	Type
FS-11	Flash adapter
SS-46	Interface adapter
CA-35S	Power cable
XMS-3	Modular cable
	Standard USB cable
FPS-10	Flash prommer box
	Standard USB cable
PKD-1	SW security device

MJ-51 module jig concept

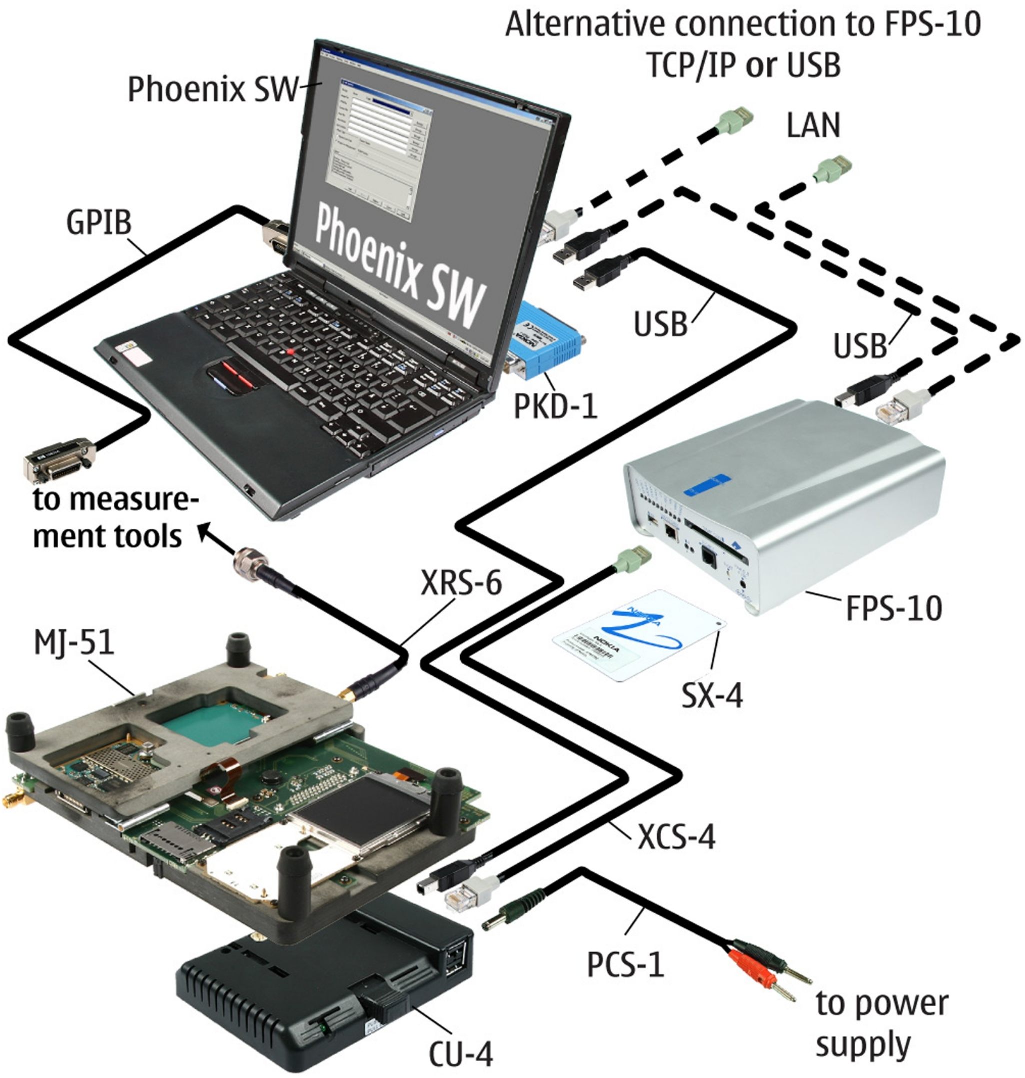

Alternative connection to FPS-10
TCP/IP or USB
Phoenix SW
LAN
GPIB
Phoenix SW
USB
USB
PKD-1
to measure-
ment tools
XRS-6
FPS-10
MJ-51
SX-4
XCS-4
PCS-1
to power
supply
CU-4

Figure 31 MJ-51 module jig service concept

Type	Description
MJ-51	Module jig
CU-4	Control unit
FPS-10	Flash prommer box
SX-4	Smart card
XMS-3	Modular cable
PCS-1	DC power cable
	Standard USB cable
	Standard USB cable
	GPIB control cable
XRS-6	RF cable
PKD-1	SW security device
	RF shield box

POS (Point of Sale) flash concept

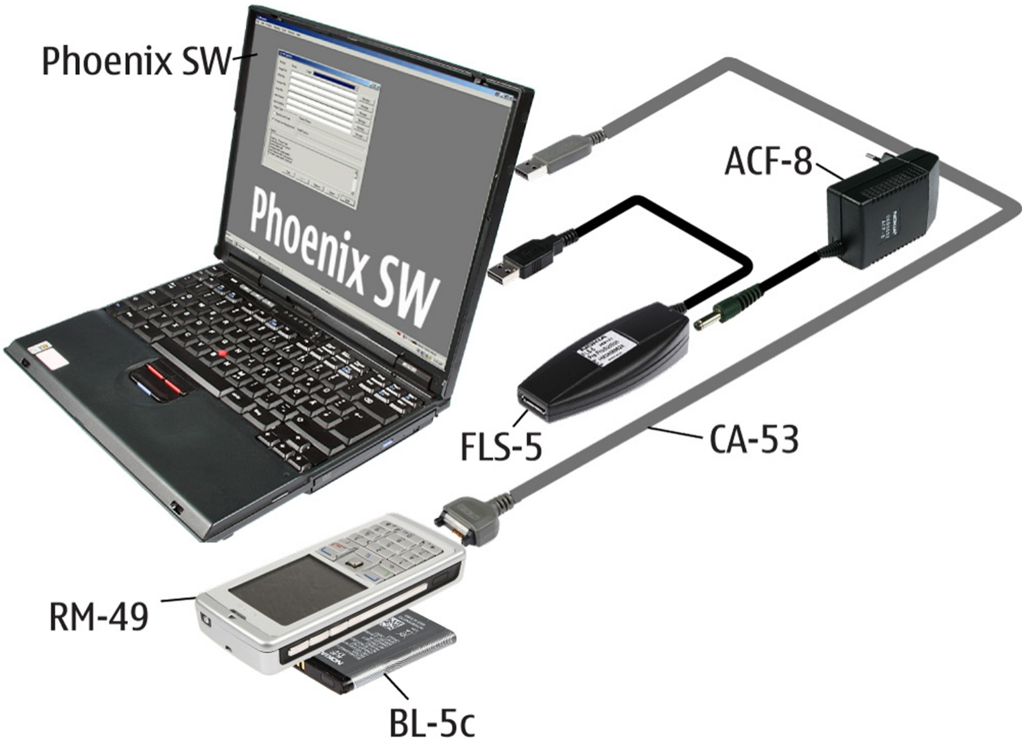


Figure 32 POS flash concept

Type	Description
CA-53	USB connectivity cable
FLS-5	POS flash device

Service concept for RF testing and RF/BB tuning

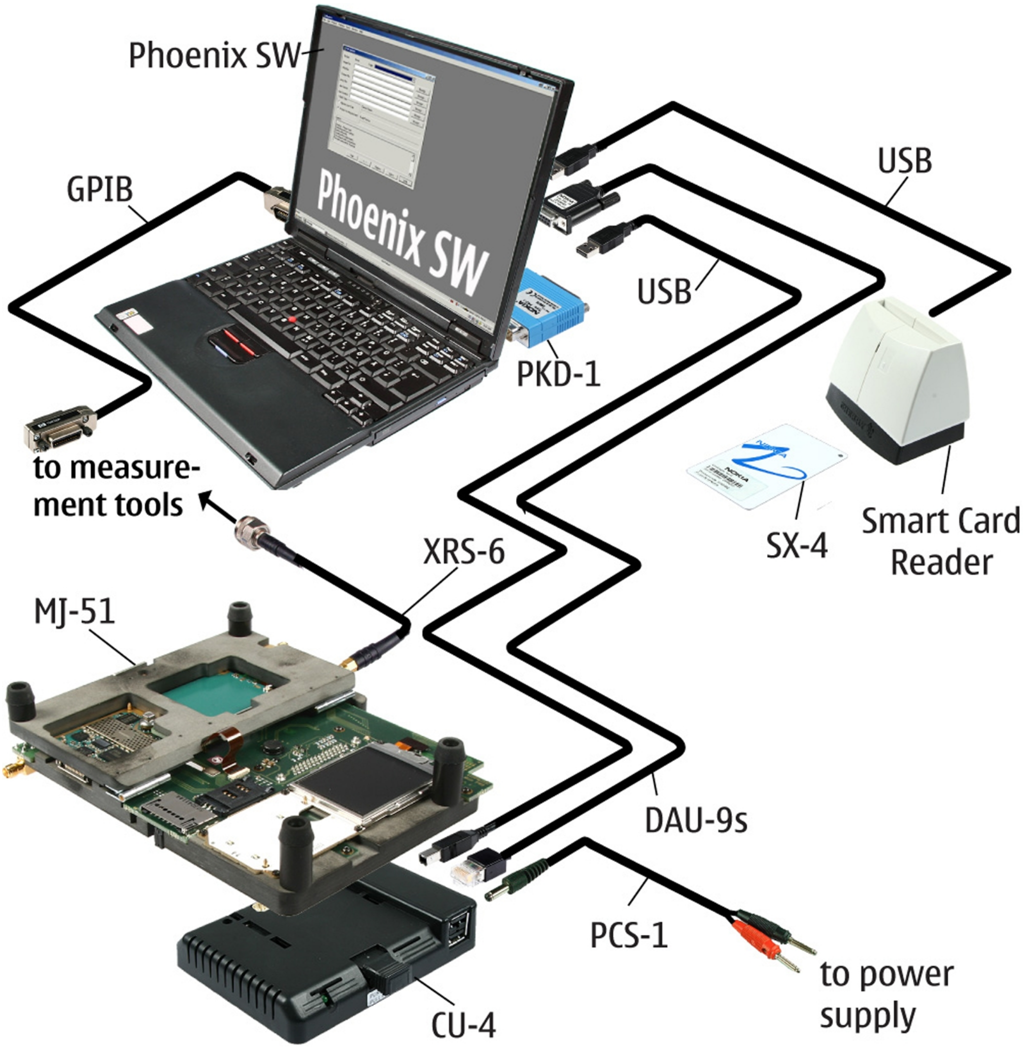

Phoenix SW
GPIB
USB
USB
PKD-1
to measure-
ment tools
XRS-6
MJ-51
SX-4
Smart Card
Reader
DAU-9s
PCS-1
to power
supply
CU-4

Figure 33 Service concept for RF testing and RF/BB tuning

Description	Type
MJ-51	Module jig
CU-4	Control unit
	Standard USB cable
PCS-1	DC power cable
	Standard USB cable + smart card reader
SX-4	Smart card
XRS-6	RF cable
	GPIB control cable
PKD-1	SW security device
	RF shield box

CU-4 flash concept with FPS-10

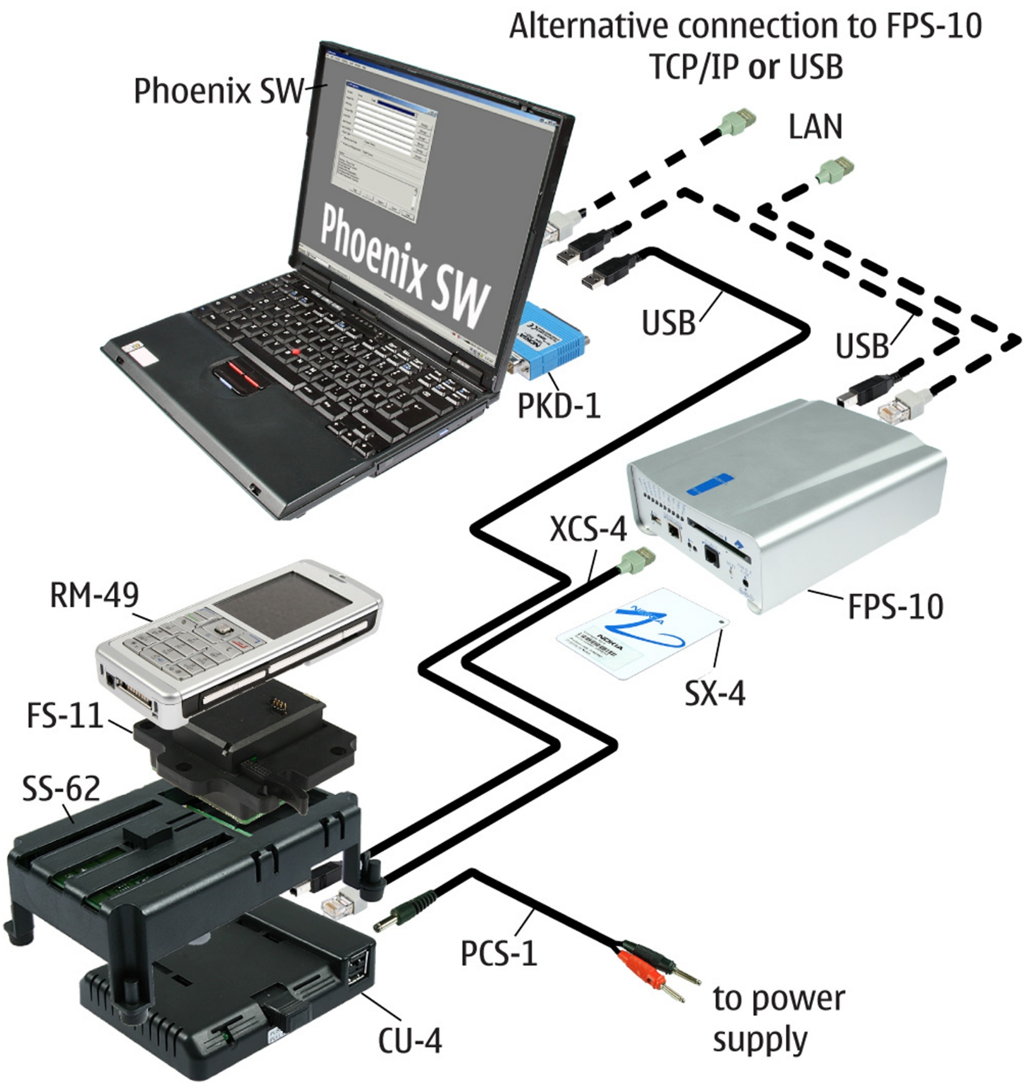

Alternative connection to FPS-10
TCP/IP or USB
LAN
Phoenix SW
Phoenix SW
USB
USB
PKD-1
XCS-4
FPS-10
RM-49
SX-4
FS-11
SS-62
PCS-1
CU-4
to power supply

Figure 34 CU-4 flash concept with FPS-10

Note: FPS-8 concept can also be used for flashing.

Description	Type
SS-62/FS-11	Flash adapter
CU-4	Control unit
XMS-3	Modular cable
PCS-1	Power cable
FPS-10	Flash prommer box
	Standard USB cable
	Standard USB cable
PKD-1	SW security device

RF testing and BB testing/tuning

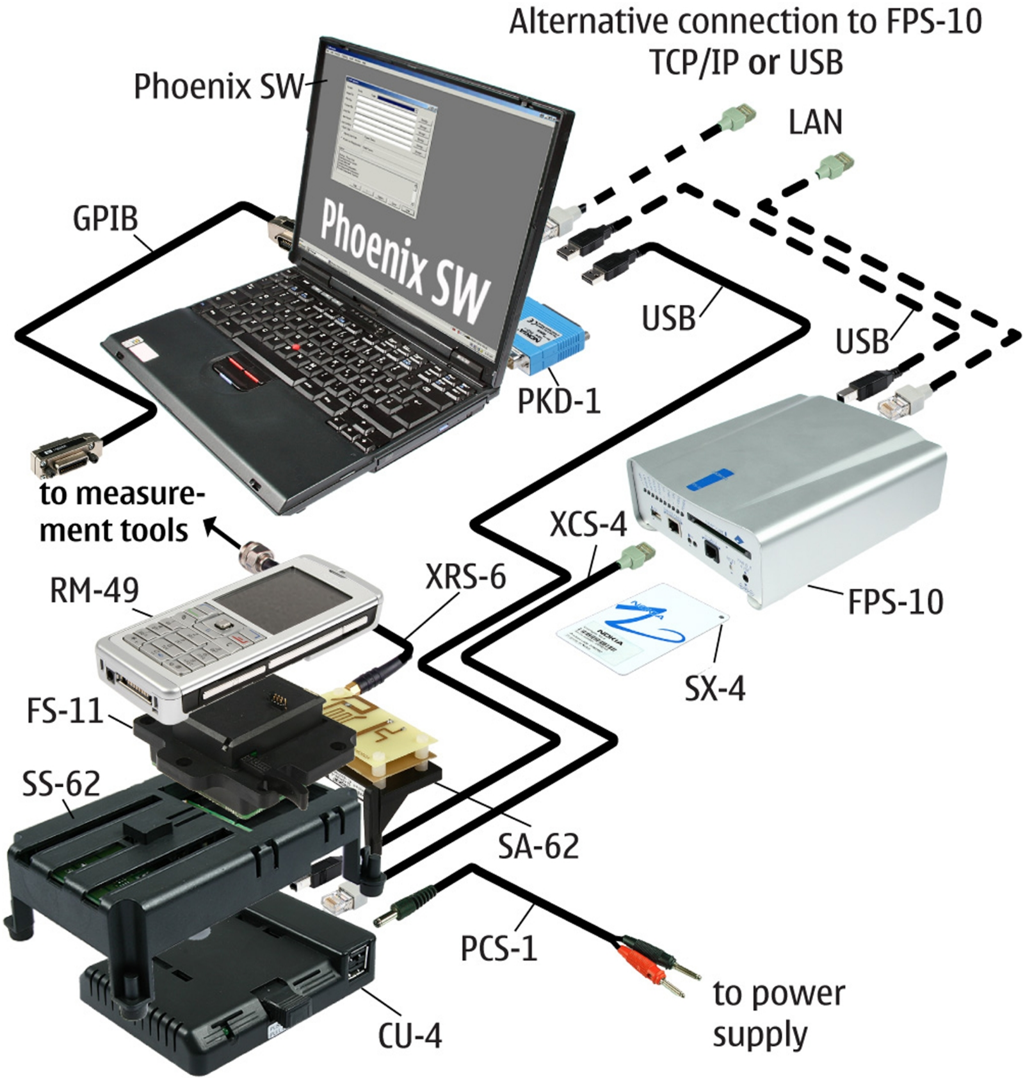

Alternative connection to FPS-10
TCP/IP or USB
LAN
Phoenix SW
Phoenix SW
GPIB
USB
USB
PKD-1
to measurement tools
XCS-4
RM-49
XRS-6
FPS-10
SX-4
FS-11
SS-62
SA-62
PCS-1
to power supply
CU-4

Figure 35 RF testing concept and BB testing/tuning

Type	Description
SS-62/FS-11	Flash adapter
CU-4	Control unit
SA-62	RF coupler
PCS-1	Power cable
	Standard USB cable
	Standard USB cable + smart card reader
SX-4	Smart card
	GPIB control cable
XRS-6	RF cable
PKD-1	SW security device

Type	Description
	RF shield box

LAN connection flash concept

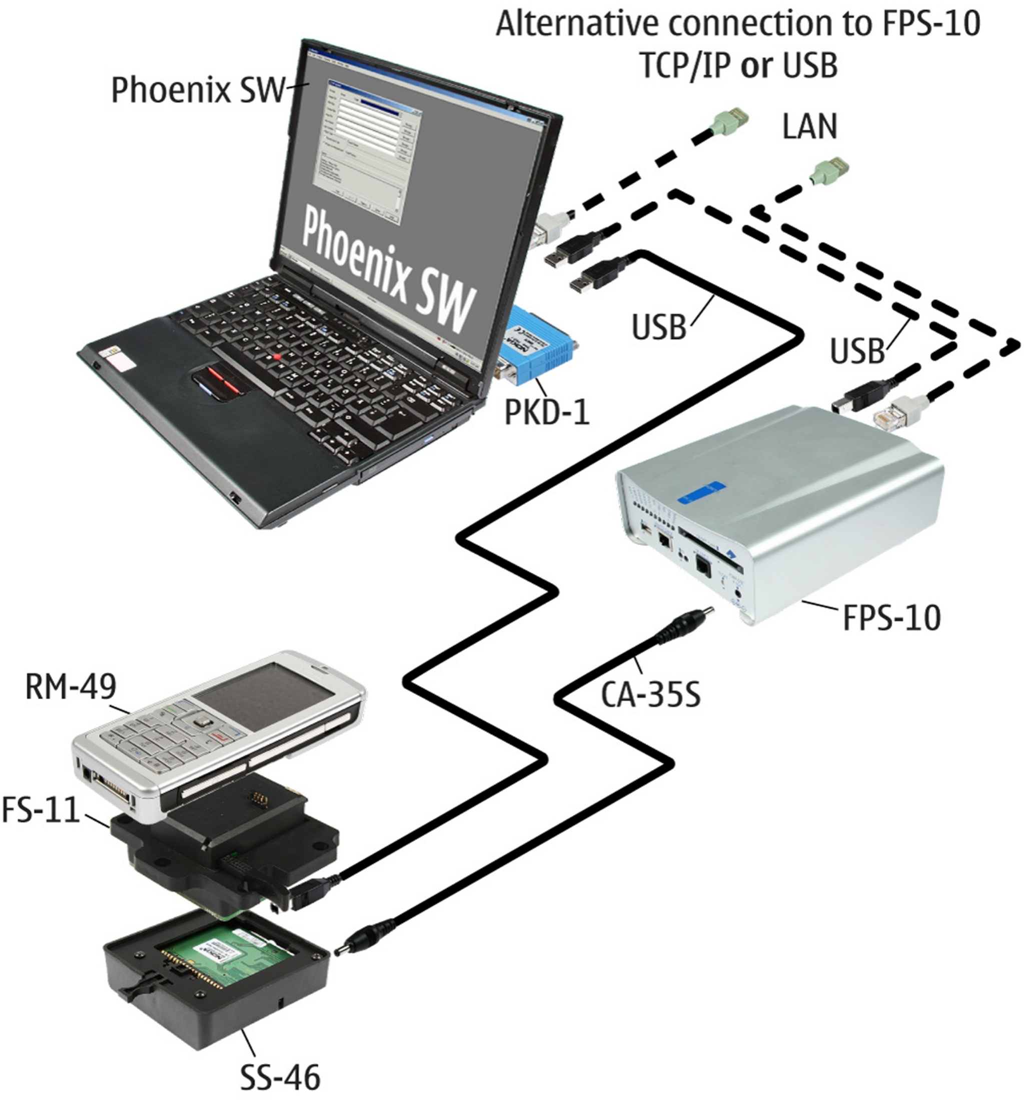

Alternative connection to FPS-10
TCP/IP or USB
Phoenix SW
Phoenix SW
LAN
USB
USB
PKD-1
FPS-10
RM-49
FS-11
CA-35S
SS-46

Figure 36 LAN connection flash concept

Description	Type
FS-11	Flash adapter
SS-46	Interface adapter
CA-35S	Power cable
XMS-3	Modular cable
FPS-10	Flash prommer box
	LAN cable
	LAN cable
PKD-1	SW security device

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5 — Disassembly/Reassembly Instructions

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Table of Contents

Disassembly instructions........5–5
Reassembly instructions........5–12

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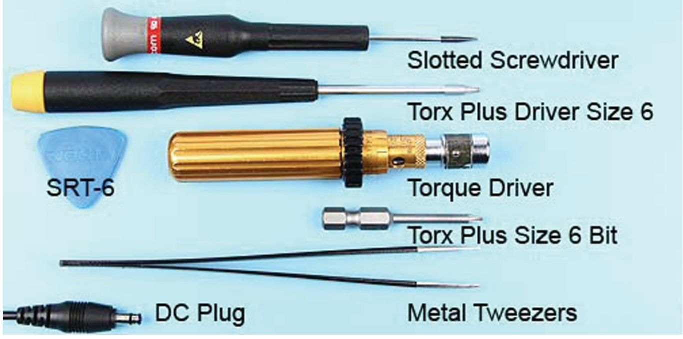
Disassembly instructions

Before you begin

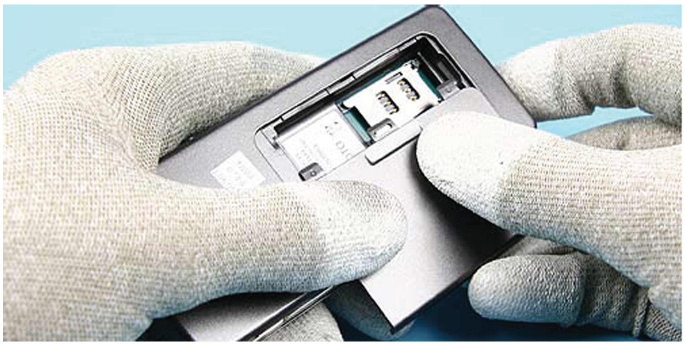
- Reassembly takes place in the reverse order.
- Reassembly specific instructions in steps: .

Steps

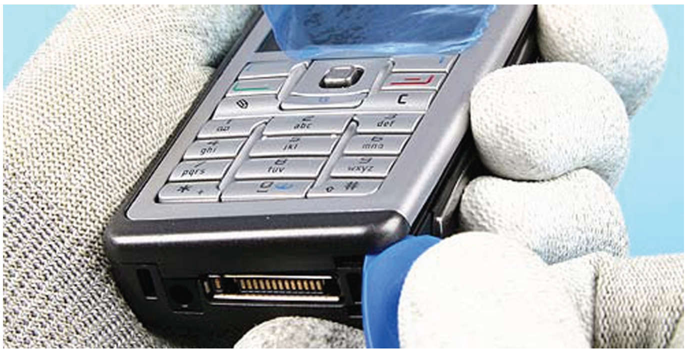
1. Use these tools for disassembly and reassembly.


Slotted Screwdriver
Torx Plus Driver Size 6
SRT-6
Torque Driver
Torx Plus Size 6 Bit
DC Plug
Metal Tweezers

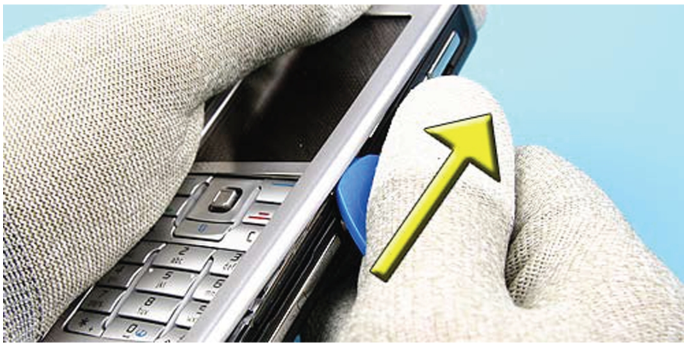
2. Remove **the Battery Cover**.



3. Carefully pry **the A-Cover Assy** with the SRT-6.



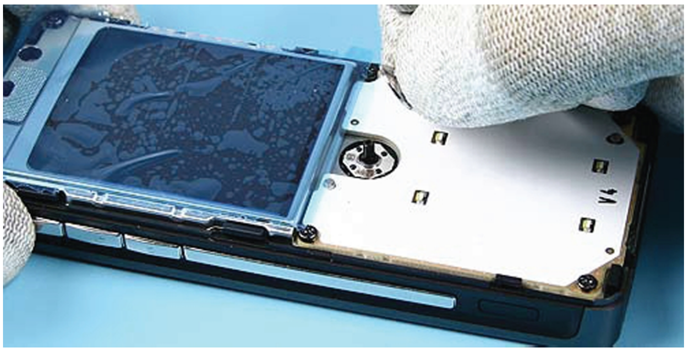
4. Slide along both sides beginning from the bottom.



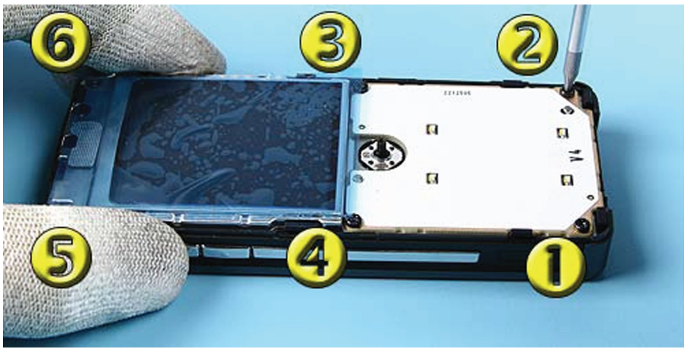
5. Protect **the LCD Shield** with a plastic film.

6. Remove **the Keymat** .

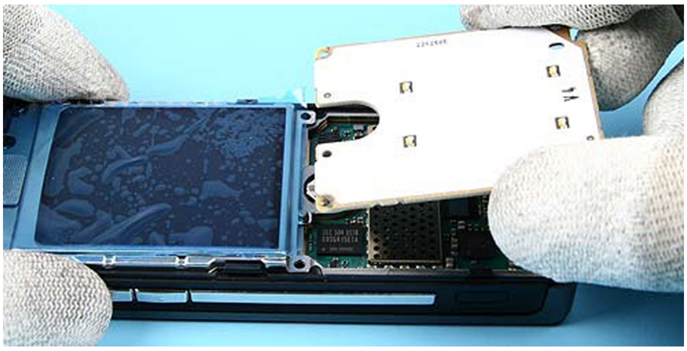
7. Remove **the Joystick Button**.



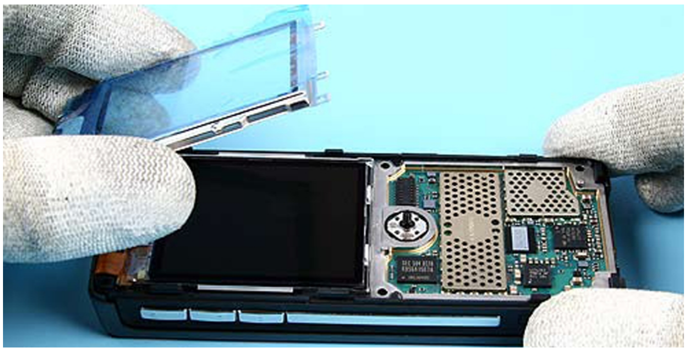
8. Unscrew the 6 Torx Plus size 6 screws in the shown order.



9. Remove **the UI PWB**.

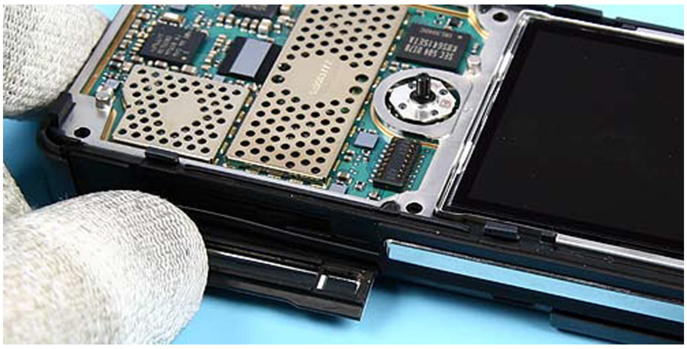


10. Remove the LCD Shield.

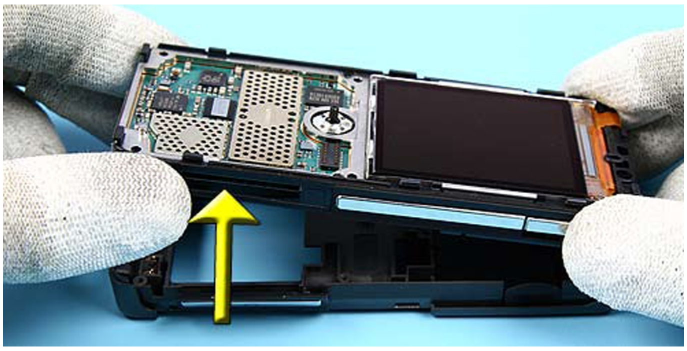


11. Protect **the LCD** with a plastic film.

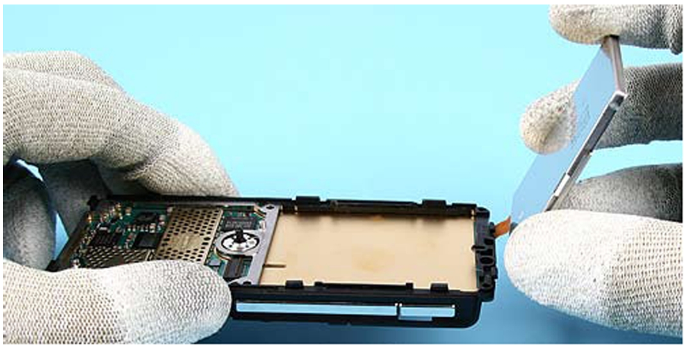
12. Open **the MMC Door** before continuing.



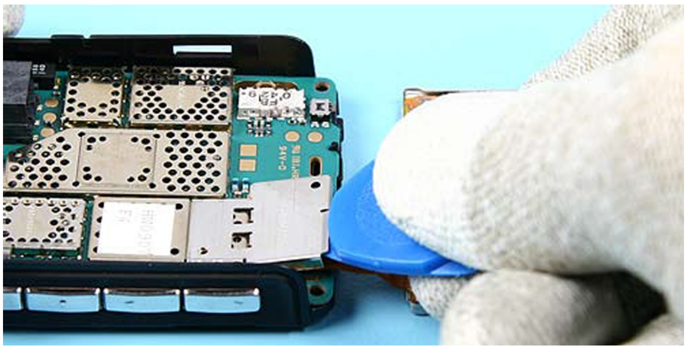
13. Separate the parts.



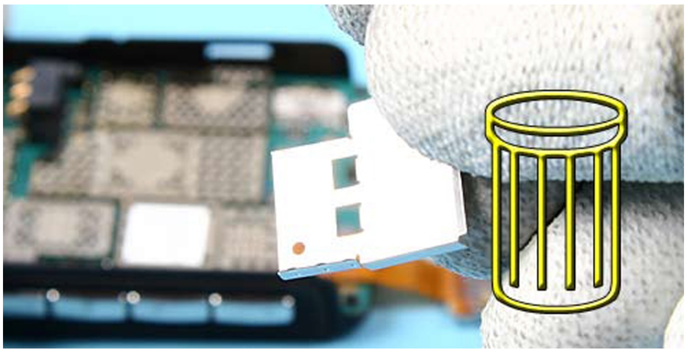
14. Flip **the LCD** as shown.



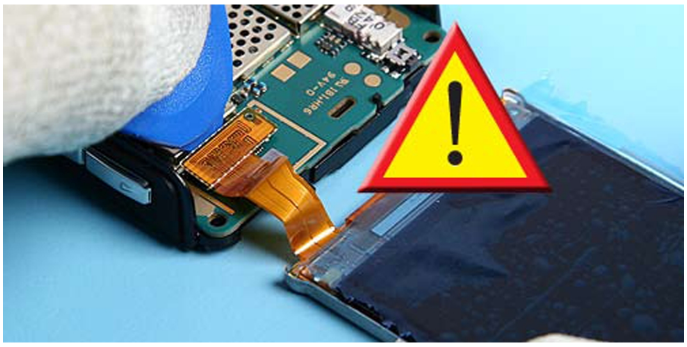
15. Gently remove **the LCD Connector Shield** with the SRT-6.



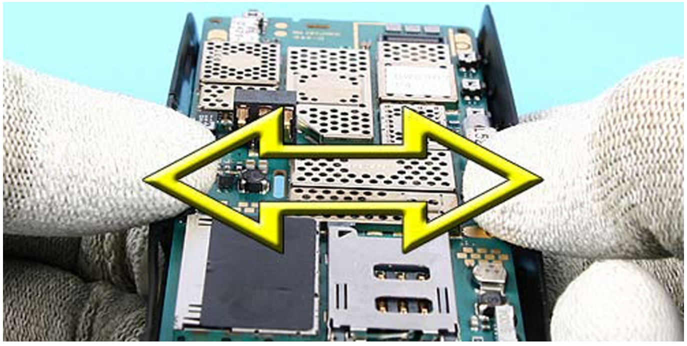
16. Always use a new shield when reassembling.



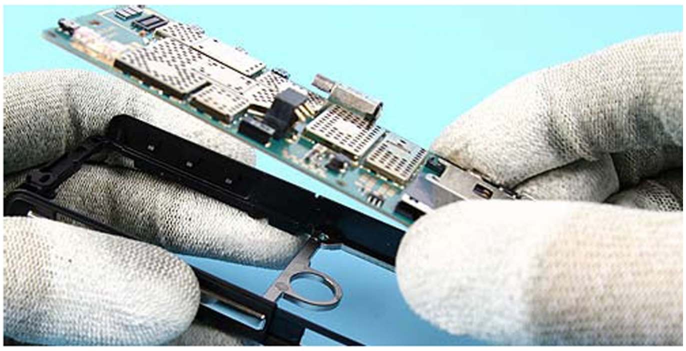
17. Open the flex connector.



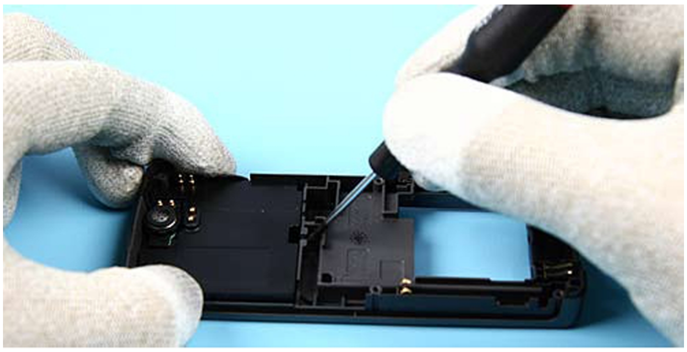
18. First, pull the edges of the cover. Then carefully pry out **the Engine Module** as shown.



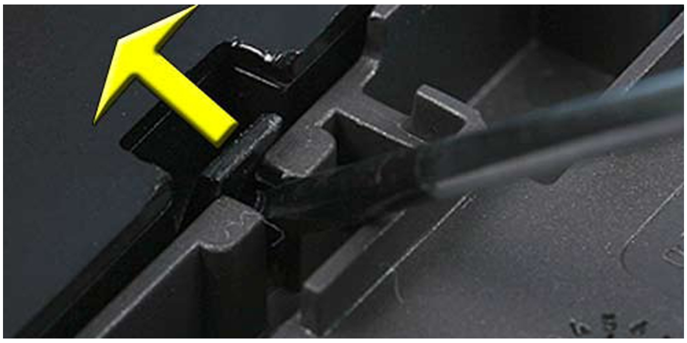
19. Lift out **the Engine Module**.



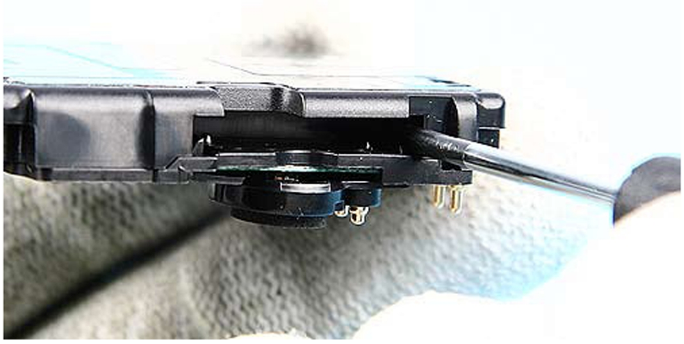
20. Use a slotted screwdriver to release **the Antenna Module Assy.**



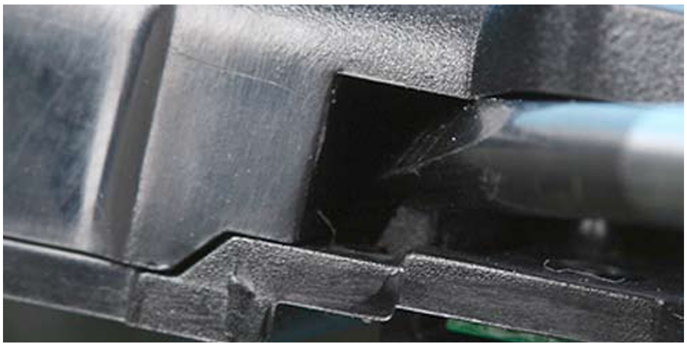
21. Unlock the clip of **the Antenna Module Assy** in shown direction.



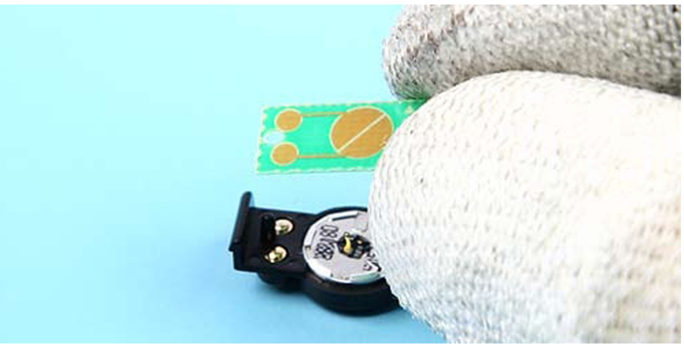
22. Use a screwdriver to unlock **the Earpiece Cover**.



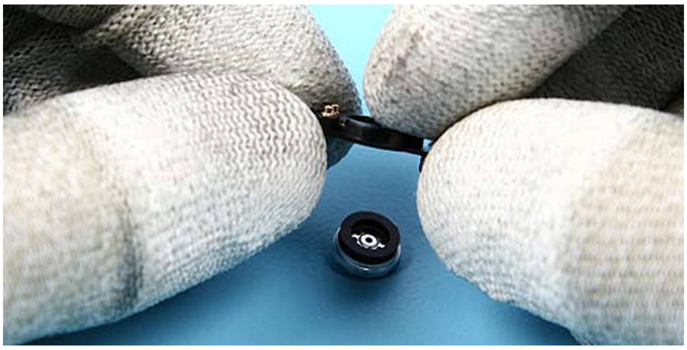
23. Unlock both clips as shown to release **the Earpiece Cover** .



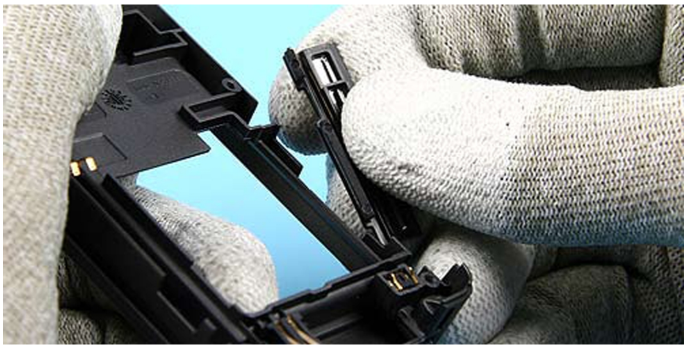
24. Remove **the Earpiece Contact PWB**.



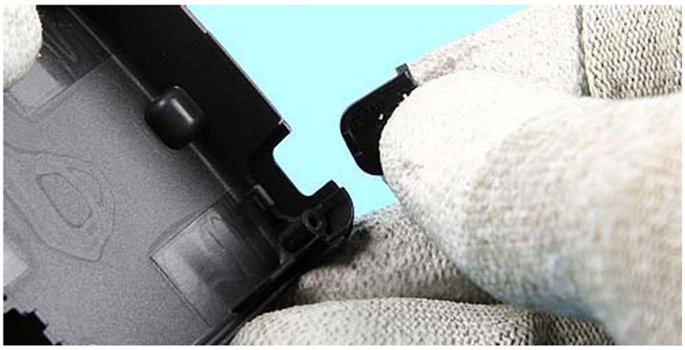
25. Push out the Earpiece.



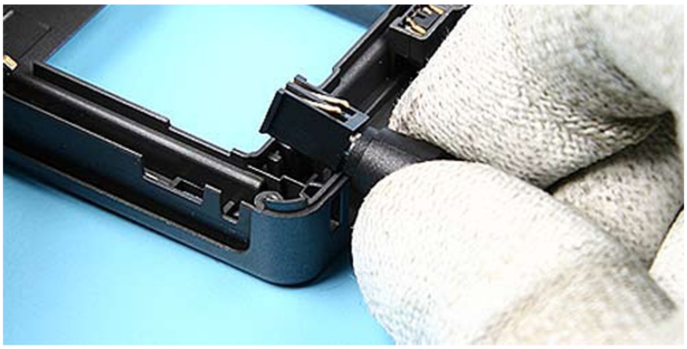
26. Pull out **the MMC Door**.



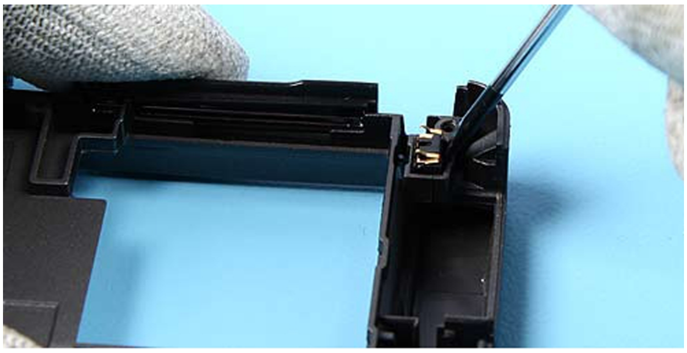
27. Remove **the Power Key**.



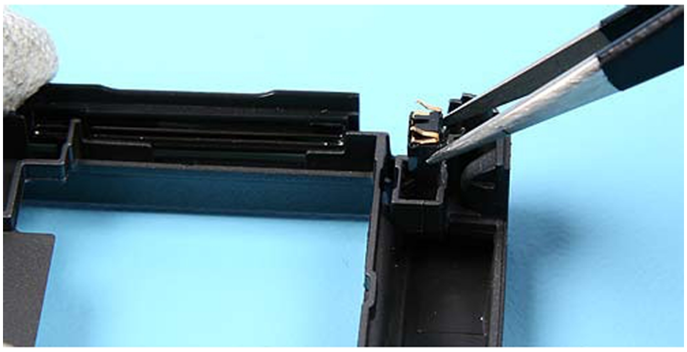
28. Remove **the DC Jack** with **theDC Plug** .



29. Ease out **the Microphone** with a slotted screwdriver. Always use a new microphone when reassemble.



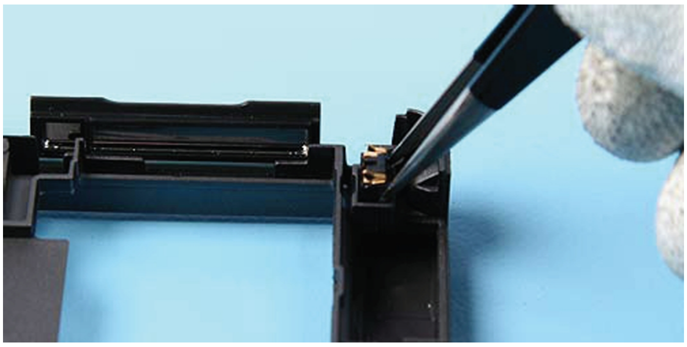
30. Remove it with tweezers.



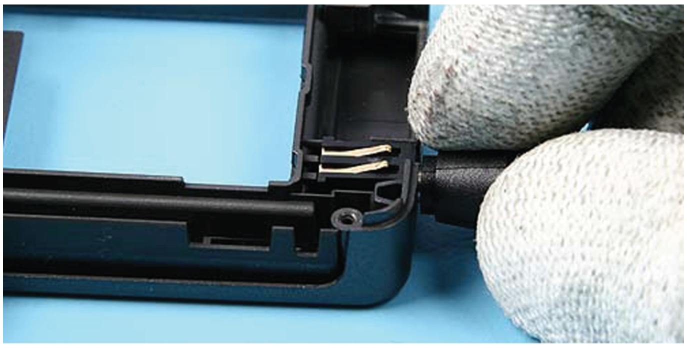
Reassembly instructions

Steps

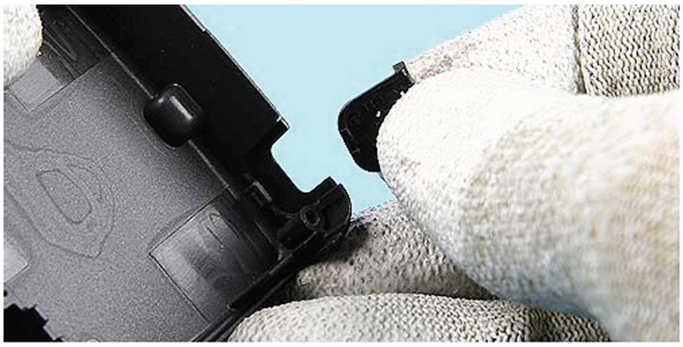
1. Insert **the Microphone** into its compartment.



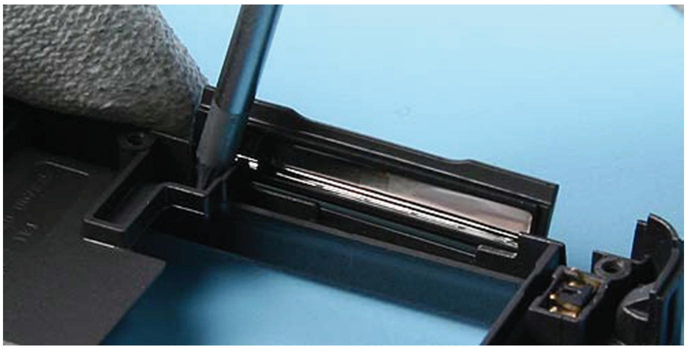
2. Insert **the DC Jack**.



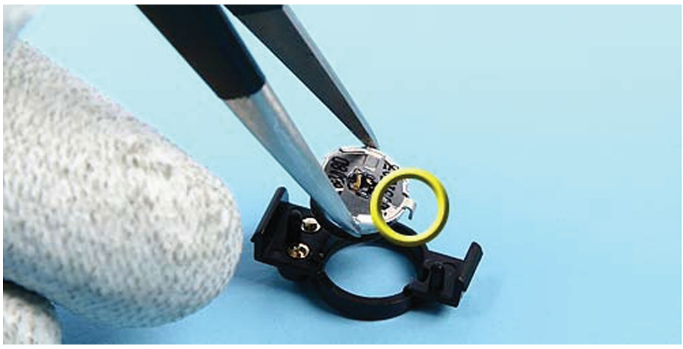
3. Place **the Power Key**.



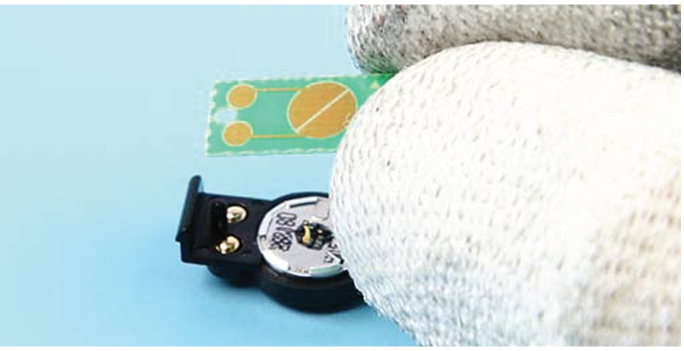
4. Insert **the MMC Door** and fix it into its compartment.



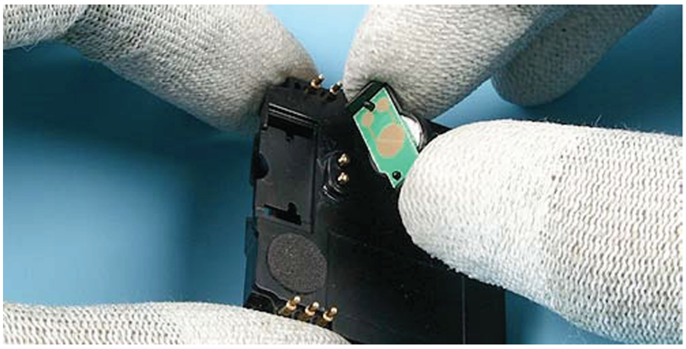
5. Place **the Earpiece**, mind the guiding. Always fit a new earpiece adhesive when replacing **the Earpiece**.



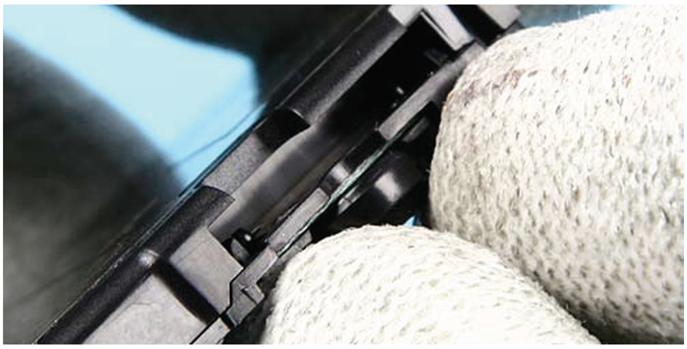
6. Place the Earpiece Contact PWB.



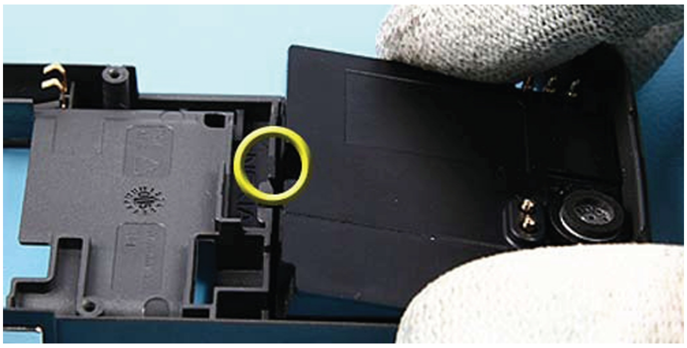
7. Mind the correct position before placing **the Earpiece Cover**.



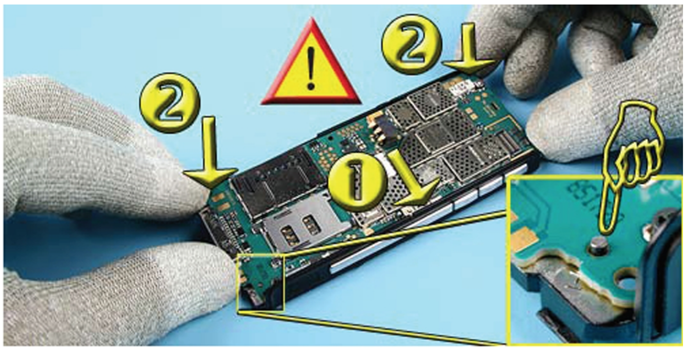
8. Fix **the Earpiece** guide at **the Antenna Module Assy**.



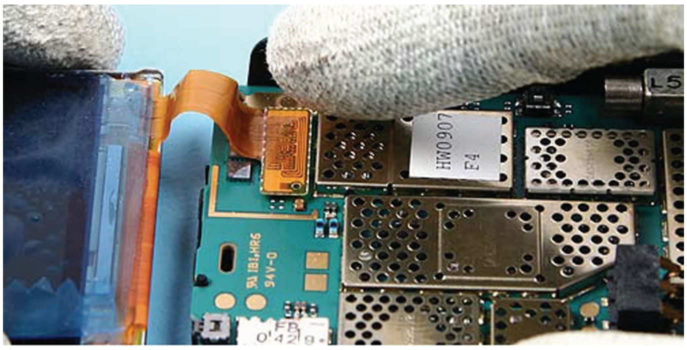
9. Place **the Antenna Module Assy** into **the B-Cover**.



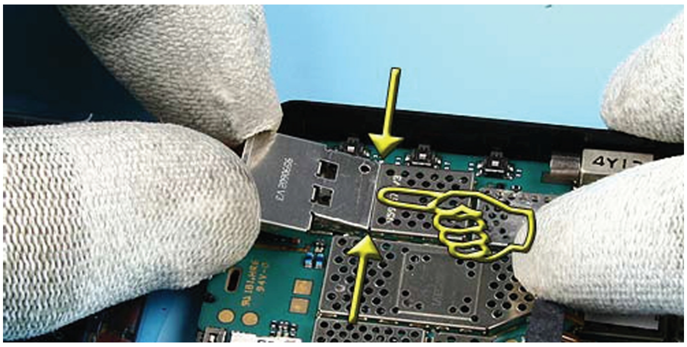
10. Place **the Engine Module** into **the C-Cover**. Start inserting **the Engine Module** at position 1 (note the guide pin) and press down at 2. Remember the joystick on the back. Do not damage it.



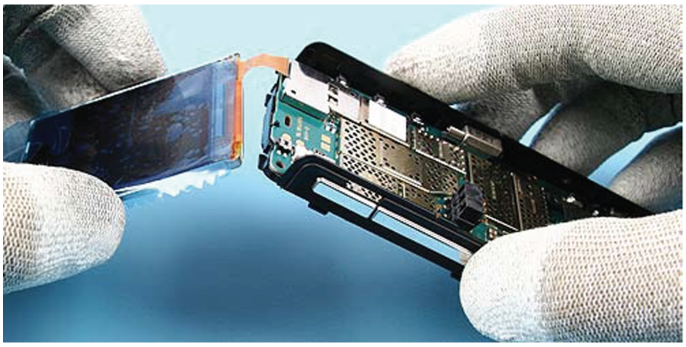
11. Close the flex connector.



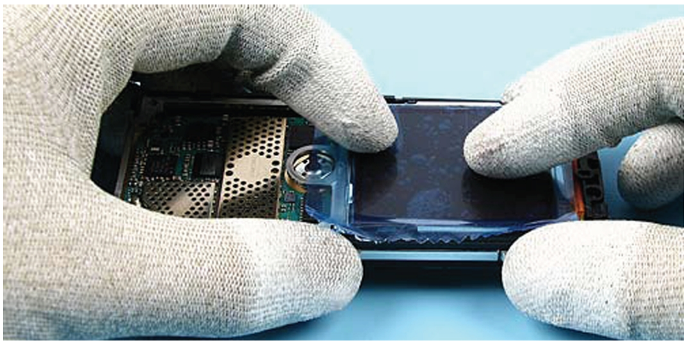
12. Place a new **LCD Connector Shield** against the cans' edge and press it down.



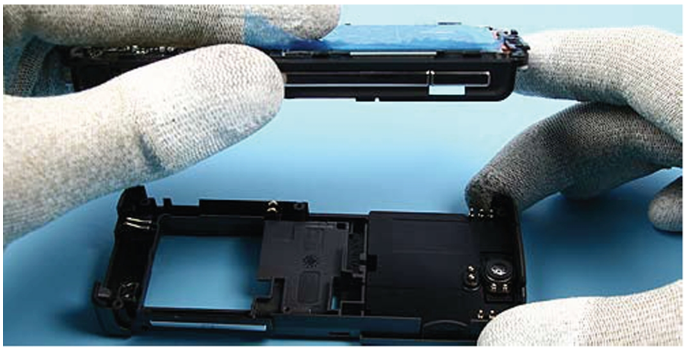
13. Flip **the LCD** and place it into its housing.



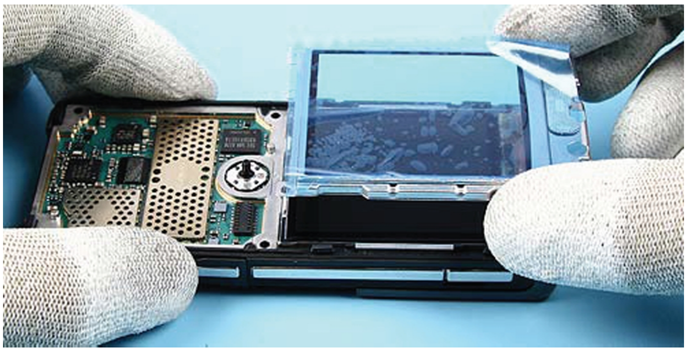
14. Note the correct position before continuing.



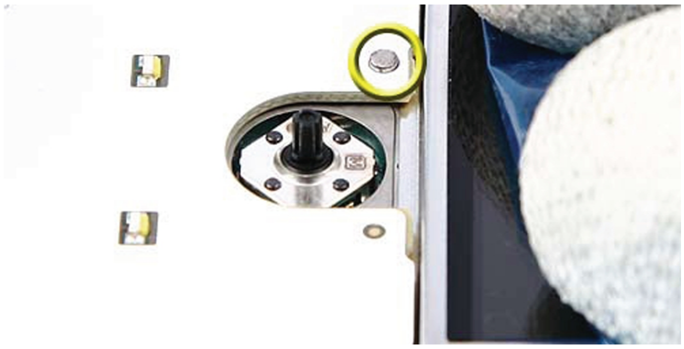
15. Assemble the parts.



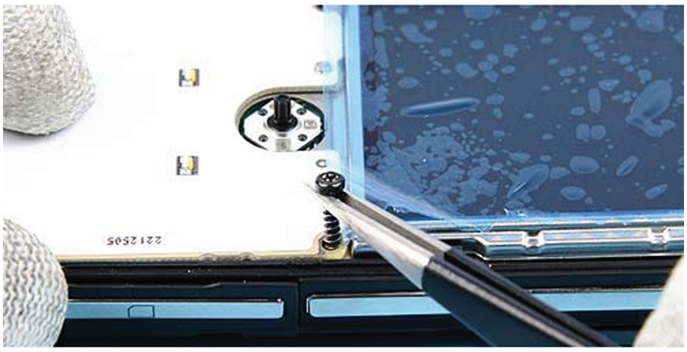
16. Check the **LCD** and **Display Shield** before placing it to the assembly.



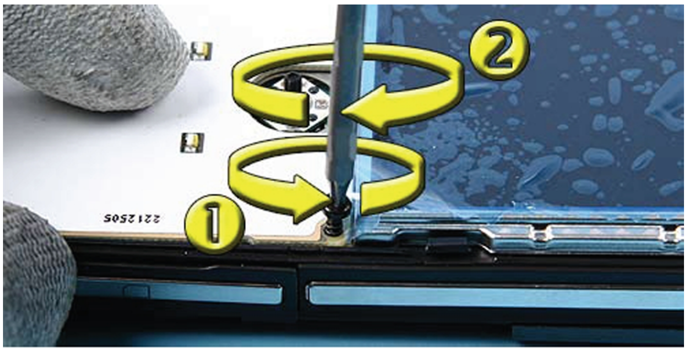
17. Position **the UI PWB Assy**. Note the guiding.



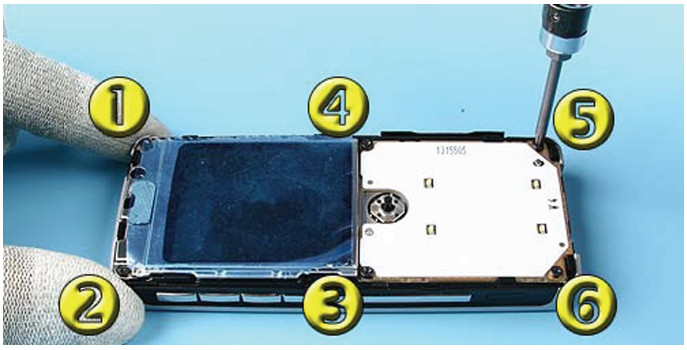
18. Insert the six Torx Plus size 6 screws.



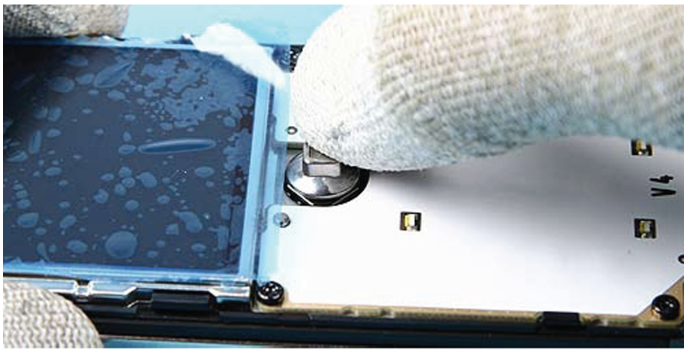
19. To prevent damaging the plastic theads, turn the screws to the left first (1), then tighten them slightly (2).



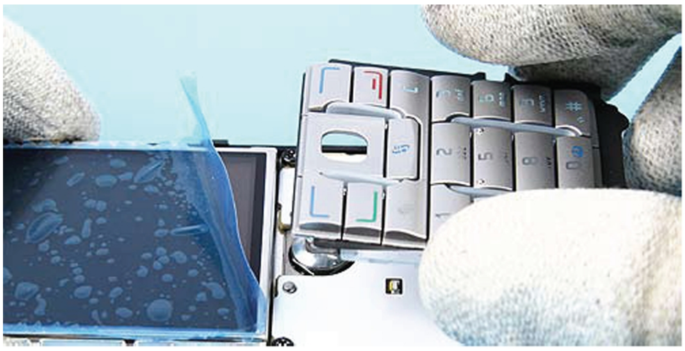
20. Apply the torque of 22 Ncm to the screws in the shown order.



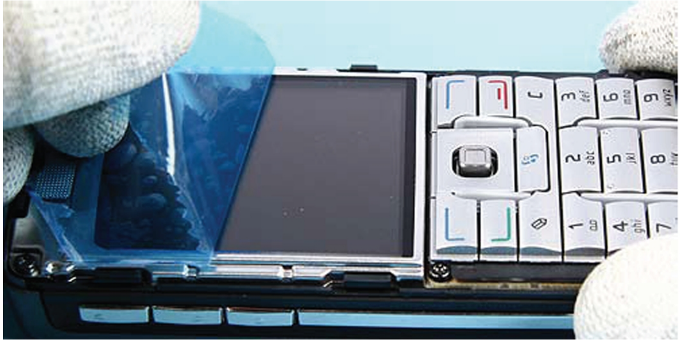
21. Place **the Joystick Button**.



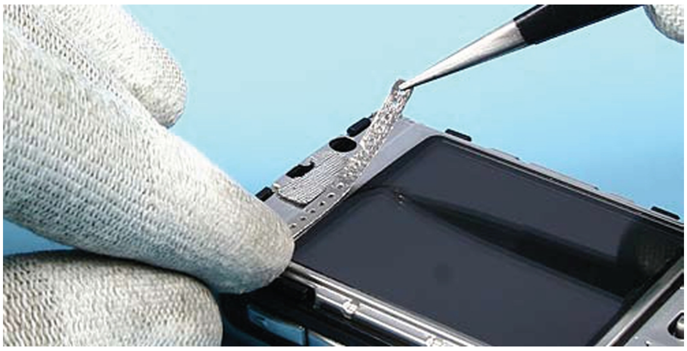
22. Place **the Keymat**.



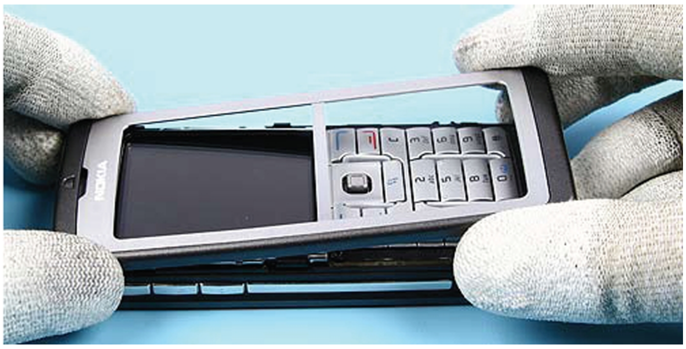
23. Remove the plastic film.



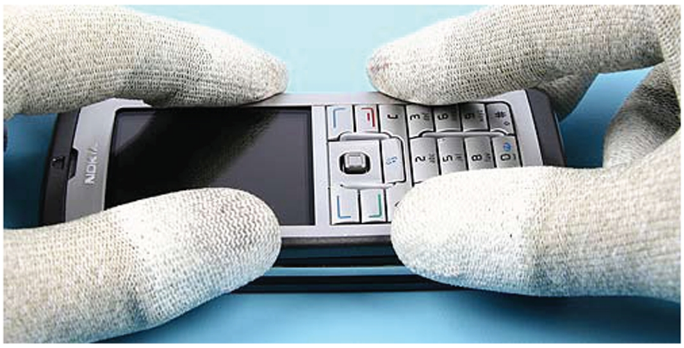
24. Glue **the Grounding Foam** onto **the Display Shield**.



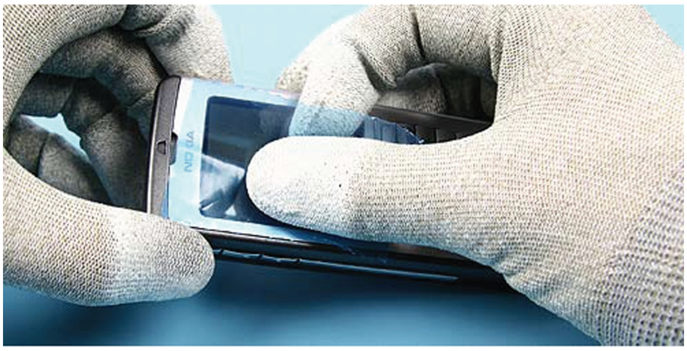
25. Place **the A-Cover** beginning from the top.



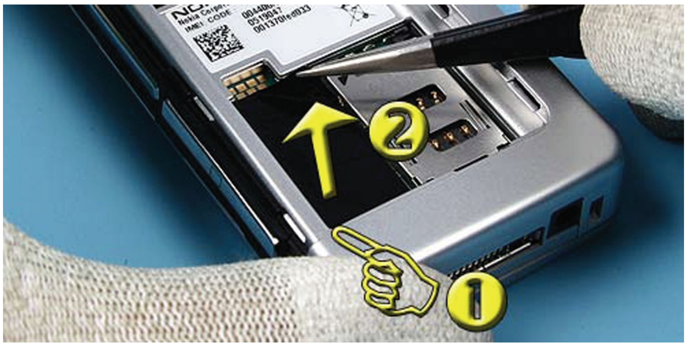
26. Click all snaps into their places.



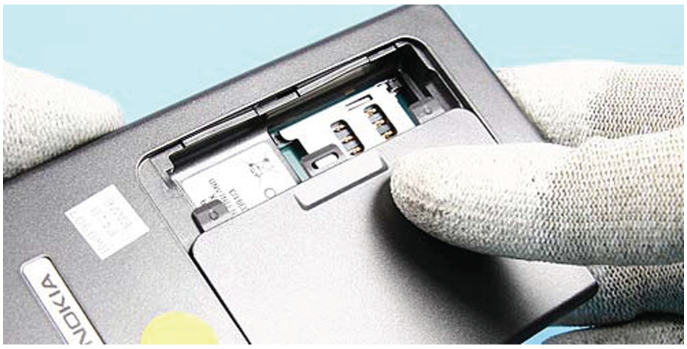
27. Protect the window with a plastic film.



28. Glue **the MMC READER LABEL** onto **the MMC reader**.



29. At last place **the Battery Cover**.



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6 — BB Troubleshooting and Manual Tuning Guide

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Baseband troubleshooting

Context

This section is intended to be a guide for localising and repairing electrical faults. The fault repairing is divided into troubleshooting paths. The following main troubleshooting tree describes the different baseband troubleshooting paths to be followed in fault situations.

Troubleshooting flow

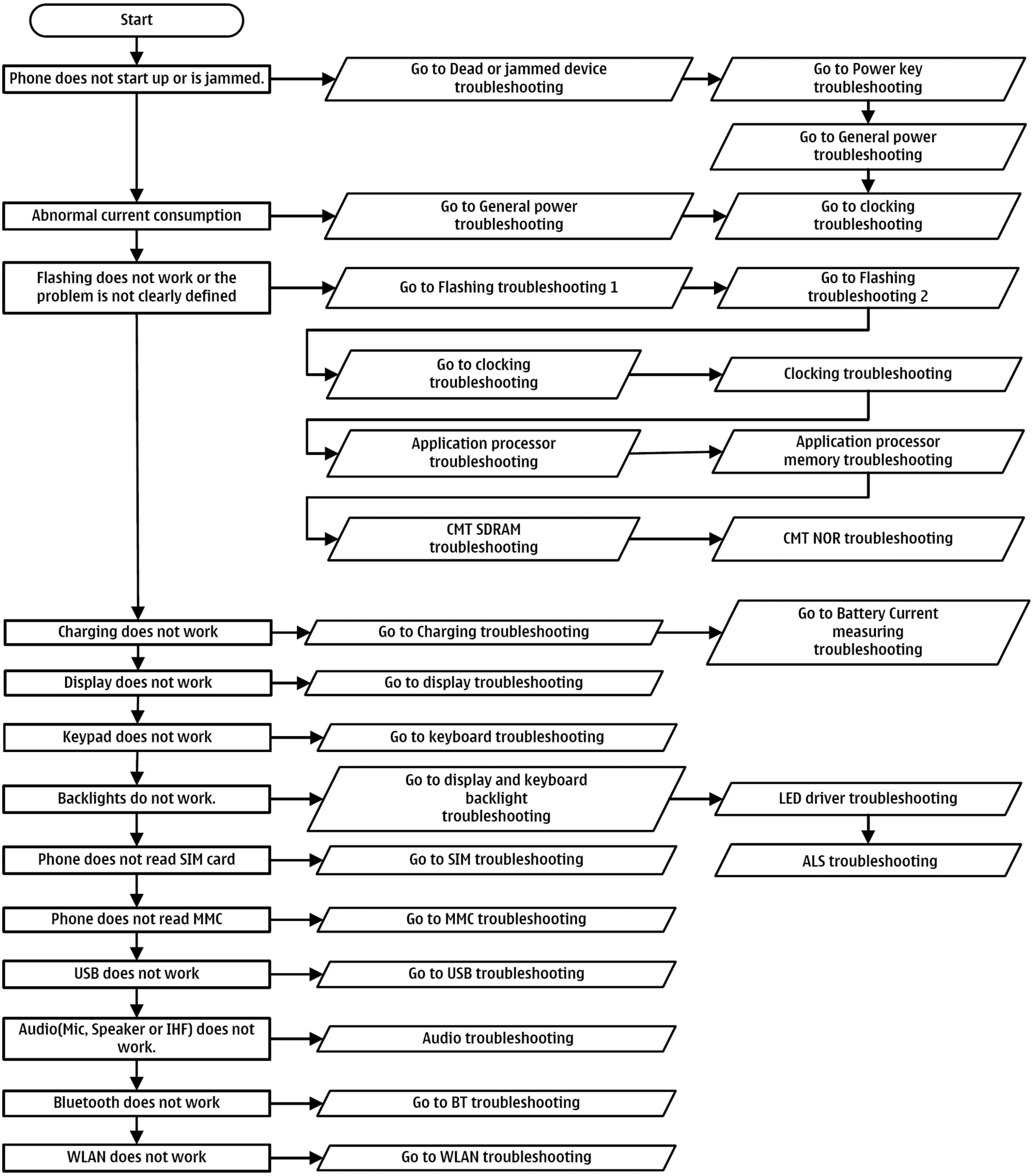
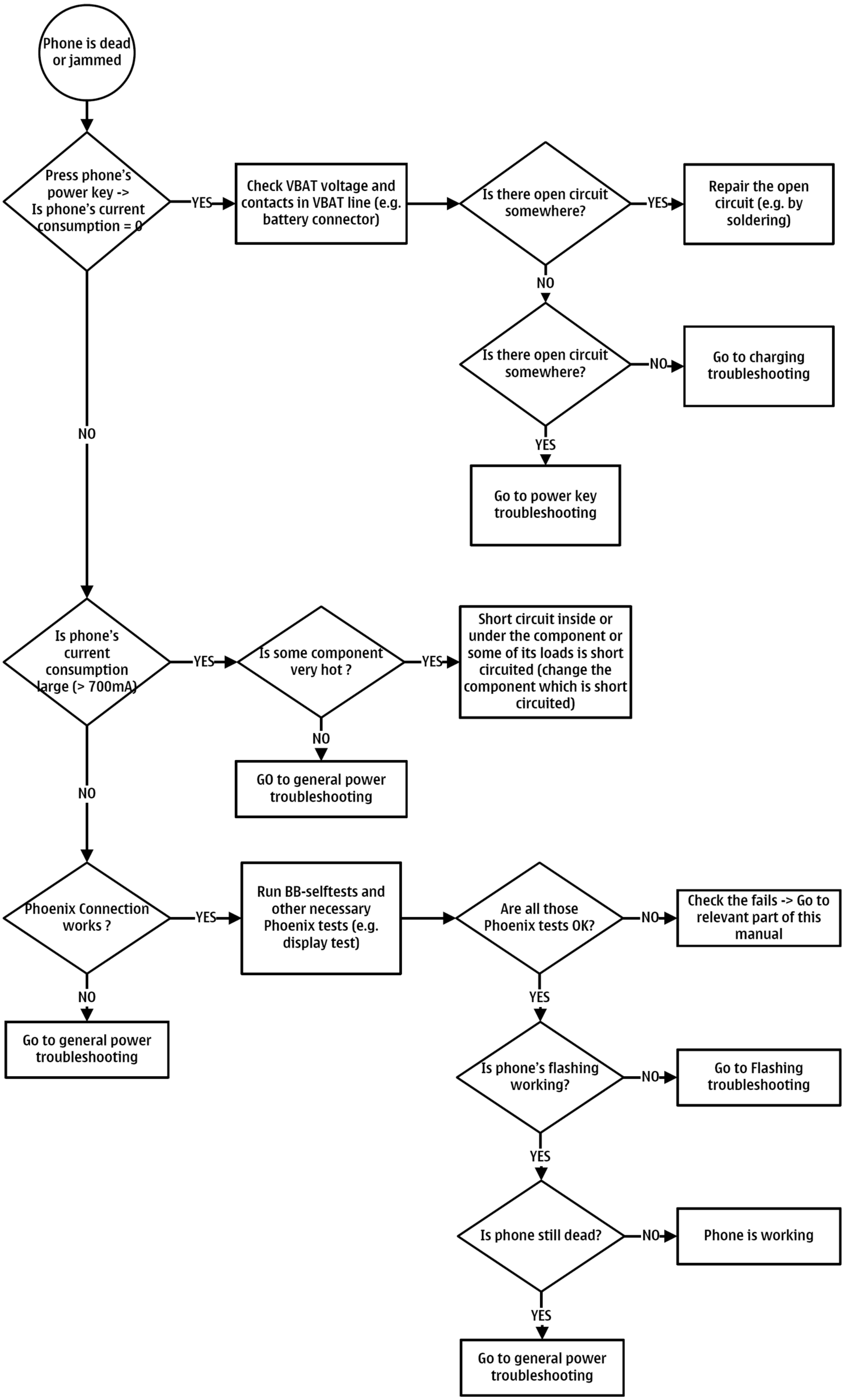

Start
Phone does not start up or is jammed.
Go to Dead or jammed device troubleshooting
Go to Power key troubleshooting
Go to General power troubleshooting
Abnormal current consumption
Go to General power troubleshooting
Go to clocking troubleshooting
Flashing does not work or the problem is not clearly defined
Go to Flashing troubleshooting 1
Go to Flashing troubleshooting 2
Go to clocking troubleshooting
Clocking troubleshooting
Application processor troubleshooting
Application processor memory troubleshooting
CMT SDRAM troubleshooting
CMT NOR troubleshooting
Charging does not work
Go to Charging troubleshooting
Go to Battery Current measuring troubleshooting
Display does not work
Go to display troubleshooting
Keypad does not work
Go to keyboard troubleshooting
Backlights do not work.
Go to display and keyboard backlight troubleshooting
LED driver troubleshooting
ALS troubleshooting
Phone does not read SIM card
Go to SIM troubleshooting
Phone does not read MMC
Go to MMC troubleshooting
USB does not work
Go to USB troubleshooting
Audio(Mic, Speaker or IHF) does not work.
Audio troubleshooting
Bluetooth does not work
Go to BT troubleshooting
WLAN does not work
Go to WLAN troubleshooting

Figure 37 Main troubleshooting tree

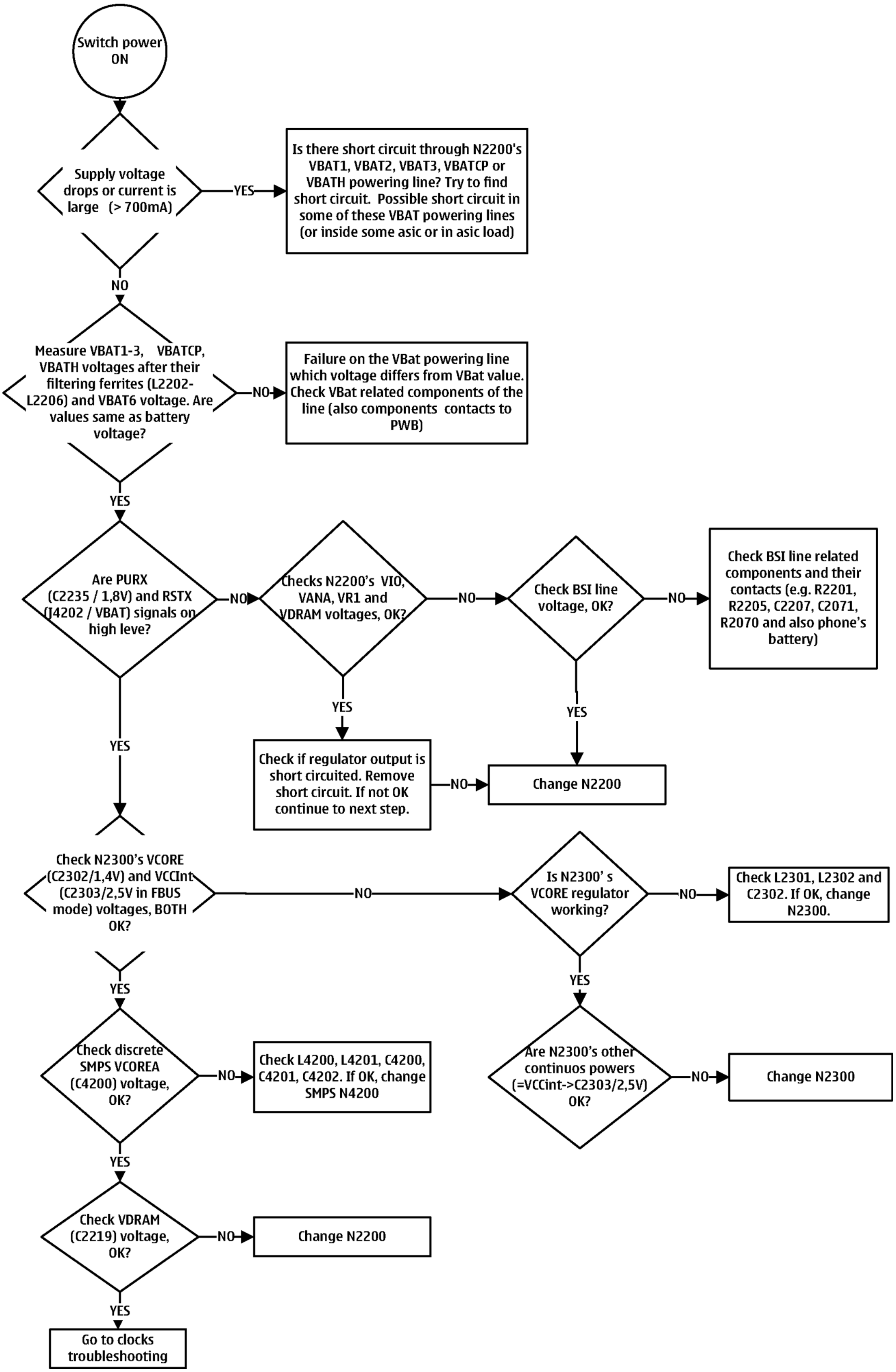
Dead or jammed device troubleshooting

Troubleshooting flow


Phone is dead or jammed
Press phone's power key -> Is phone's current consumption = 0
YES
Check VBAT voltage and contacts in VBAT line (e.g. battery connector)
Is there open circuit somewhere?
YES
Repair the open circuit (e.g. by soldering)
NO
Is there open circuit somewhere?
NO
Go to charging troubleshooting
YES
Go to power key troubleshooting
NO
Is phone's current consumption large (> 700mA)
YES
Is some component very hot ?
YES
Short circuit inside or under the component or some of its loads is short circuited (change the component which is short circuited)
NO
GO to general power troubleshooting
NO
Phoenix Connection works ?
YES
Run BB-selftests and other necessary Phoenix tests (e.g. display test)
Are all those Phoenix tests OK?
NO
Check the fails -> Go to relevant part of this manual
NO
Go to general power troubleshooting
YES
Is phone's flashing working?
NO
Go to Flashing troubleshooting
YES
Is phone still dead?
NO
Phone is working
YES
Go to general power troubleshooting

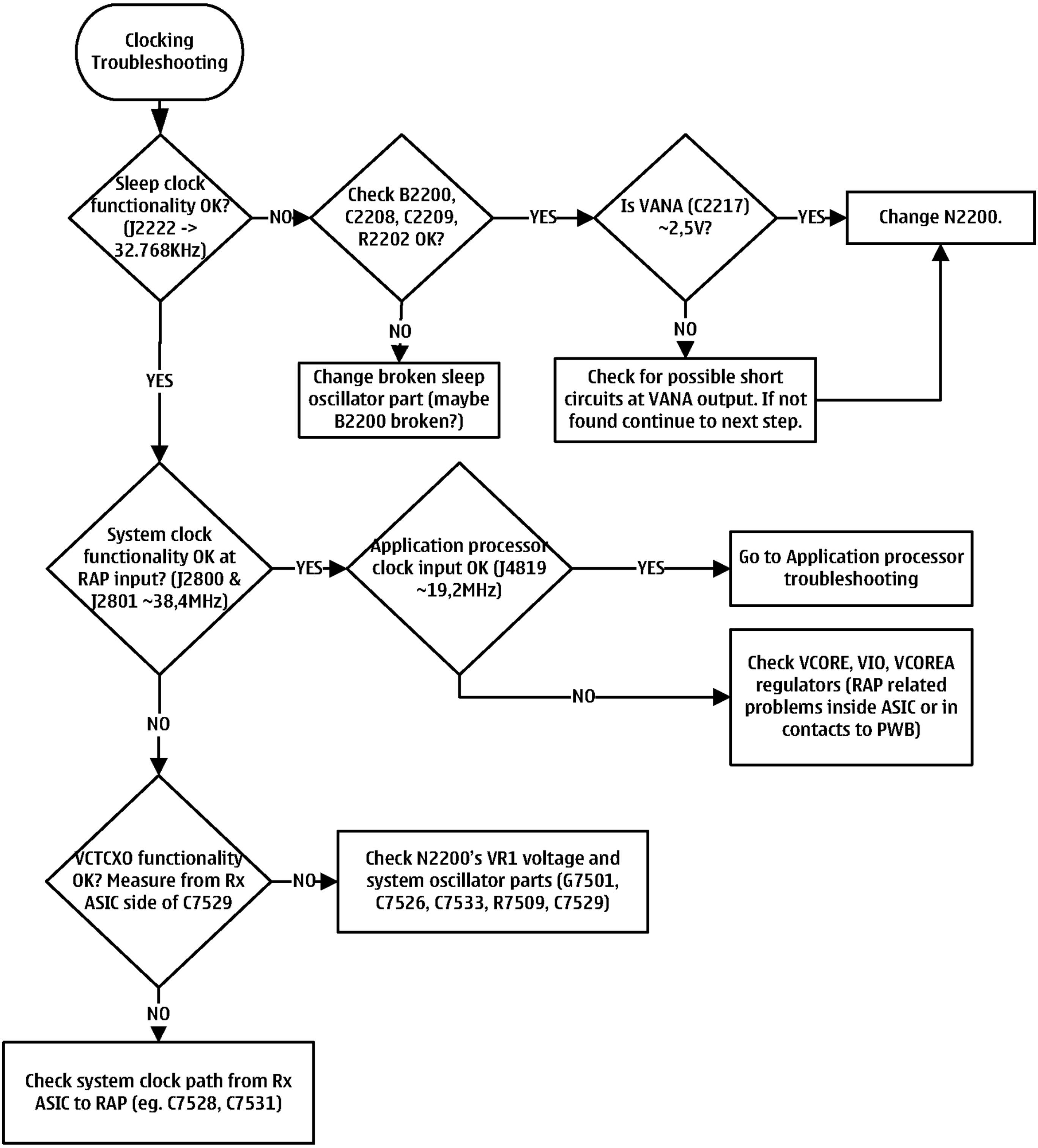
General power checking troubleshooting

Troubleshooting flow


Switch power ON
Supply voltage drops or current is large (> 700mA)
YES
Is there short circuit through N2200's VBAT1, VBAT2, VBAT3, VBATCP or VBATH powering line? Try to find short circuit. Possible short circuit in some of these VBAT powering lines (or inside some asic or in asic load)
NO
Measure VBAT1-3, VBATCP, VBATH voltages after their filtering ferrites (L2202-L2206) and VBAT6 voltage. Are values same as battery voltage?
NO
Failure on the VBat powering line which voltage differs from VBat value. Check VBat related components of the line (also components contacts to PWB)
YES
Are PURX (C2235 / 1,8V) and RSTX (J4202 / VBAT) signals on high leve?
NO
Checks N2200's VIO, VANA, VR1 and VDRAM voltages, OK?
NO
Check BSI line voltage, OK?
NO
Check BSI line related components and their contacts (e.g. R2201, R2205, C2207, C2071, R2070 and also phone's battery)
YES
Check if regulator output is short circuited. Remove short circuit. If not OK continue to next step.
NO
Change N2200
YES
YES
Check N2300's VCORE (C2302/1,4V) and VCCInt (C2303/2,5V in FBUS mode) voltages, BOTH OK?
NO
Is N2300' s VCORE regulator working?
NO
Check L2301, L2302 and C2302. If OK, change N2300.
YES
Are N2300's other continuos powers (=VCCint->C2303/2,5V) OK?
NO
Change N2300
YES
Check discrete SMPS VCOREA (C4200) voltage, OK?
NO
Check L4200, L4201, C4200, C4201, C4202. If OK, change SMPS N4200
YES
Check VDRAM (C2219) voltage, OK?
NO
Change N2200
YES
Go to clocks troubleshooting

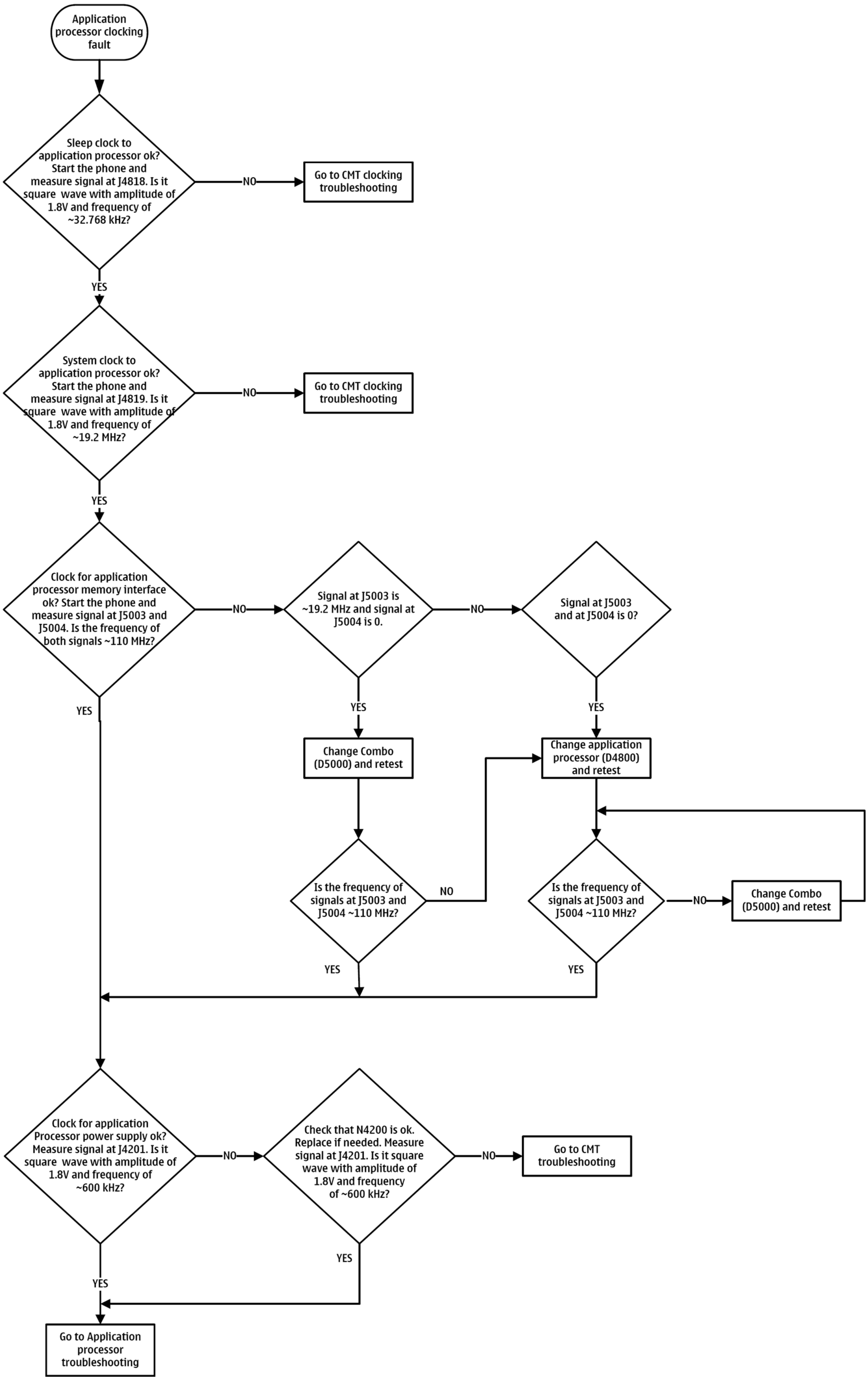
Clocking troubleshooting

Troubleshooting flow


Clocking Troubleshooting
Sleep clock functionality OK? (J2222 -> 32.768KHz)
NO
Check B2200, C2208, C2209, R2202 OK?
YES
Is VANA (C2217) ~2,5V?
YES
Change N2200.
NO
Change broken sleep oscillator part (maybe B2200 broken?)
NO
Check for possible short circuits at VANA output. If not found continue to next step.
YES
System clock functionality OK at RAP input? (J2800 & J2801 ~38,4MHz)
YES
Application processor clock input OK (J4819 ~19,2MHz)
YES
Go to Application processor troubleshooting
NO
Check VCORE, VIO, VCOREA regulators (RAP related problems inside ASIC or in contacts to PWB)
NO
VCTCXO functionality OK? Measure from Rx ASIC side of C7529
NO
Check N2200's VR1 voltage and system oscillator parts (G7501, C7526, C7533, R7509, C7529)
NO
Check system clock path from Rx ASIC to RAP (eg. C7528, C7531)

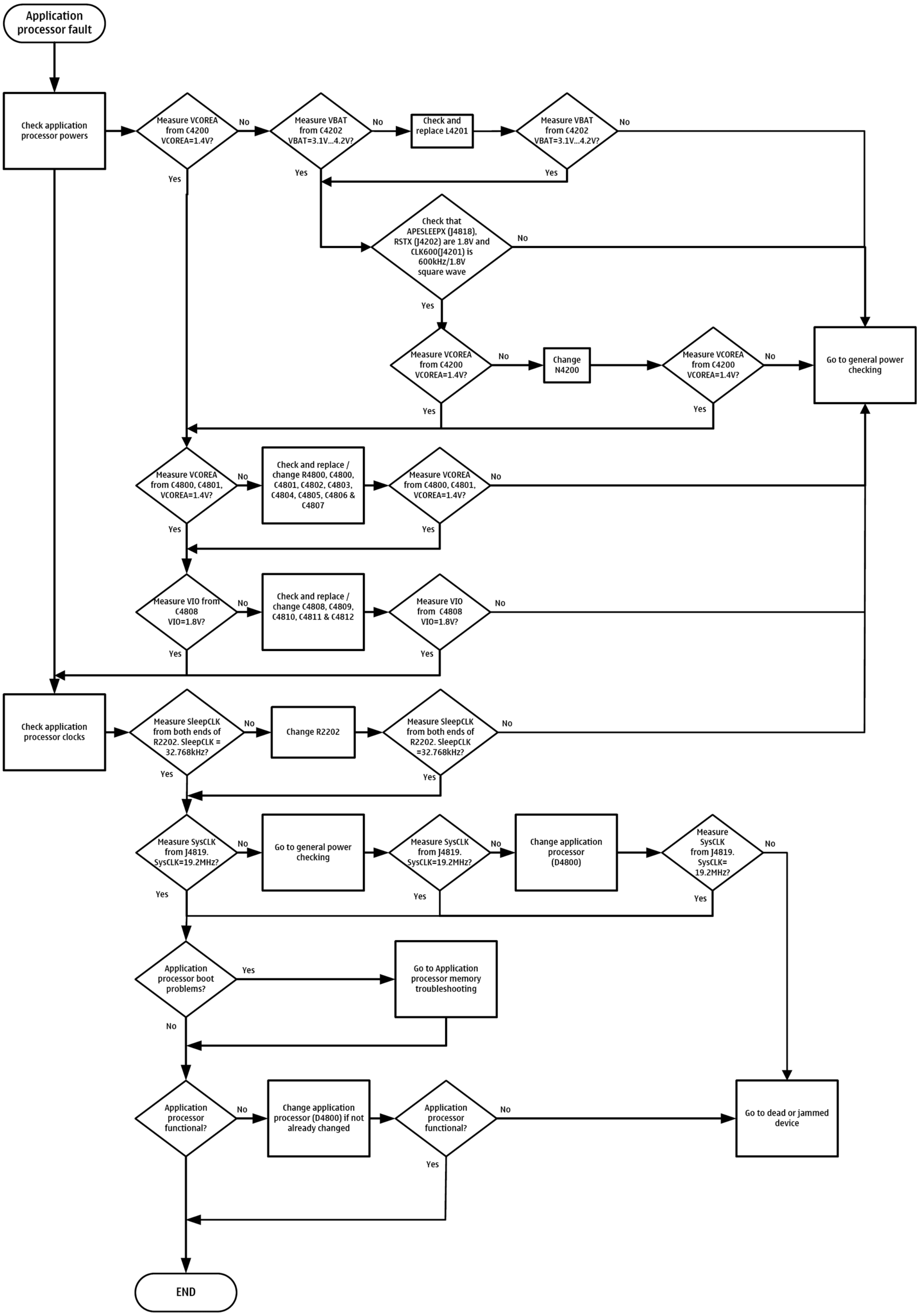
Application processor clocking troubleshooting

Troubleshooting flow


Application processor clocking fault
Sleep clock to application processor ok? Start the phone and measure signal at J4818. Is it square wave with amplitude of 1.8V and frequency of ~32.768 kHz?
NO
Go to CMT clocking troubleshooting
YES
System clock to application processor ok? Start the phone and measure signal at J4819. Is it square wave with amplitude of 1.8V and frequency of ~19.2 MHz?
NO
Go to CMT clocking troubleshooting
YES
Clock for application processor memory interface ok? Start the phone and measure signal at J5003 and J5004. Is the frequency of both signals ~110 MHz?
NO
Signal at J5003 is ~19.2 MHz and signal at J5004 is 0.
NO
Signal at J5003 and at J5004 is 0?
YES
YES
YES
Change Combo (D5000) and retest
Change application processor (D4800) and retest
Is the frequency of signals at J5003 and J5004 ~110 MHz?
NO
Is the frequency of signals at J5003 and J5004 ~110 MHz?
NO
Change Combo (D5000) and retest
YES
YES
Clock for application Processor power supply ok? Measure signal at J4201. Is it square wave with amplitude of 1.8V and frequency of ~600 kHz?
NO
Check that N4200 is ok. Replace if needed. Measure signal at J4201. Is it square wave with amplitude of 1.8V and frequency of ~600 kHz?
NO
Go to CMT troubleshooting
YES
YES
Go to Application processor troubleshooting

Application processor troubleshooting

Troubleshooting flow


Application processor fault
Check application processor powers
Measure VCOREA from C4200 VCOREA=1.4V?
No
Yes
Measure VBAT from C4202 VBAT=3.1V...4.2V?
No
Yes
Check and replace L4201
Measure VBAT from C4202 VBAT=3.1V...4.2V?
No
Yes
Check that APESLEEPX (J4818), RSTX (J4202) are 1.8V and CLK600(J4201) is 600kHz/1.8V square wave
No
Yes
Measure VCOREA from C4200 VCOREA=1.4V?
No
Yes
Change N4200
Measure VCOREA from C4200 VCOREA=1.4V?
No
Yes
Go to general power checking
Measure VCOREA from C4800, C4801, VCOREA=1.4V?
No
Yes
Check and replace / change R4800, C4800, C4801, C4802, C4803, C4804, C4805, C4806 & C4807
Measure VCOREA from C4800, C4801, VCOREA=1.4V?
No
Yes
Measure VIO from C4808 VIO=1.8V?
No
Yes
Check and replace / change C4808, C4809, C4810, C4811 & C4812
Measure VIO from C4808 VIO=1.8V?
No
Yes
Check application processor clocks
Measure SleepCLK from both ends of R2202. SleepCLK = 32.768kHz?
No
Yes
Change R2202
Measure SleepCLK from both ends of R2202. SleepCLK =32.768kHz?
No
Yes
Measure SysCLK from J4819. SysCLK=19.2MHz?
No
Yes
Go to general power checking
Measure SysCLK from J4819. SysCLK=19.2MHz?
No
Yes
Change application processor (D4800)
Measure SysCLK from J4819. SysCLK= 19.2MHz?
No
Yes
Application processor boot problems?
Yes
No
Go to Application processor memory troubleshooting
Application processor functional?
No
Change application processor (D4800) if not already changed
Application processor functional?
No
Yes
Go to dead or jammed device
END

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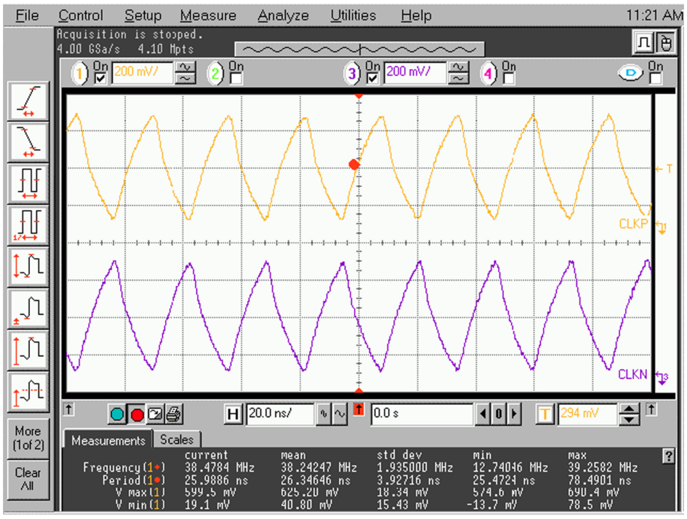
File
Control
Setup
Measure
Analyze
Utilities
Help
11:21 AM
1 On
200 mV/
2 On
3 On
200 mV/
4 On
On
CLKP
CLKN
T
More (1of 2)
Clear All
H 20.0 ns/
0.0 s
T 294 mV
Measurements
Scales

```
Acquisition is stopped.
4.00 GSa/s   4.10 Mpts

                  current       mean          std dev        min            max
  Frequency(1)    38.4784 MHz   38.24247 MHz  1.935000 MHz   12.74046 MHz   39.2582 MHz
     Period(1)    25.9886 ns    26.34646 ns   3.92716 ns     25.4724 ns     78.4901 ns
      V max(1)    599.5 mV      625.20 mV     18.34 mV       574.6 mV       690.4 mV
      V min(1)    19.1 mV       40.80 mV      15.43 mV      -13.7 mV        78.5 mV
```

Figure 38 SysCLK from J2800 and J2801

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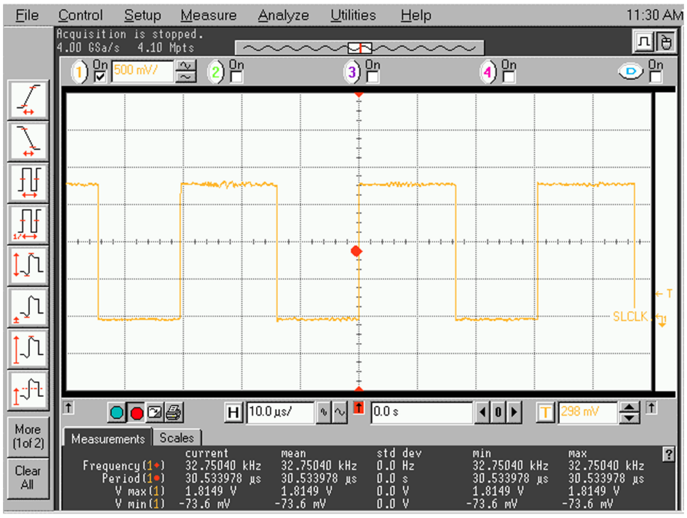

File
Control
Setup
Measure
Analyze
Utilities
Help
11:30 AM
1 On
500 mV/
2 On
3 On
4 On
On
SLCLK
T
More (1of 2)
Clear All
H 10.0 µs/
0.0 s
T 298 mV
Measurements
Scales

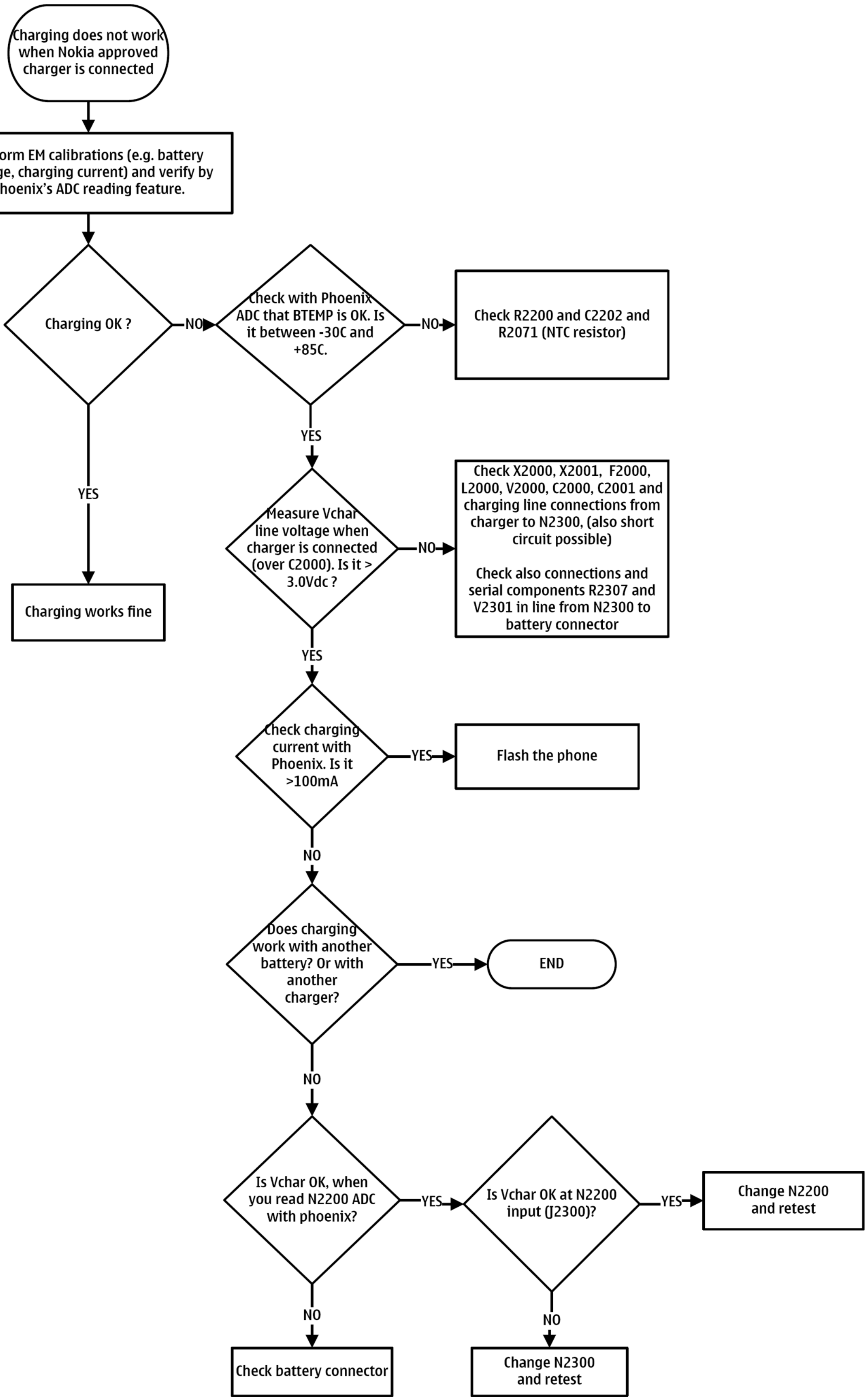
```
Acquisition is stopped.
4.00 GSa/s   4.10 Mpts

                  current        mean           std dev   min            max
  Frequency(1)    32.75040 kHz   32.75040 kHz   0.0 Hz    32.75040 kHz   32.75040 kHz
     Period(1)    30.533978 µs   30.533978 µs   0.0 s     30.533978 µs   30.533978 µs
      V max(1)    1.8149 V       1.8149 V       0.0 V     1.8149 V       1.8149 V
      V min(1)   -73.6 mV       -73.6 mV        0.0 V    -73.6 mV       -73.6 mV
```

Figure 39 SleepCLK from J2217

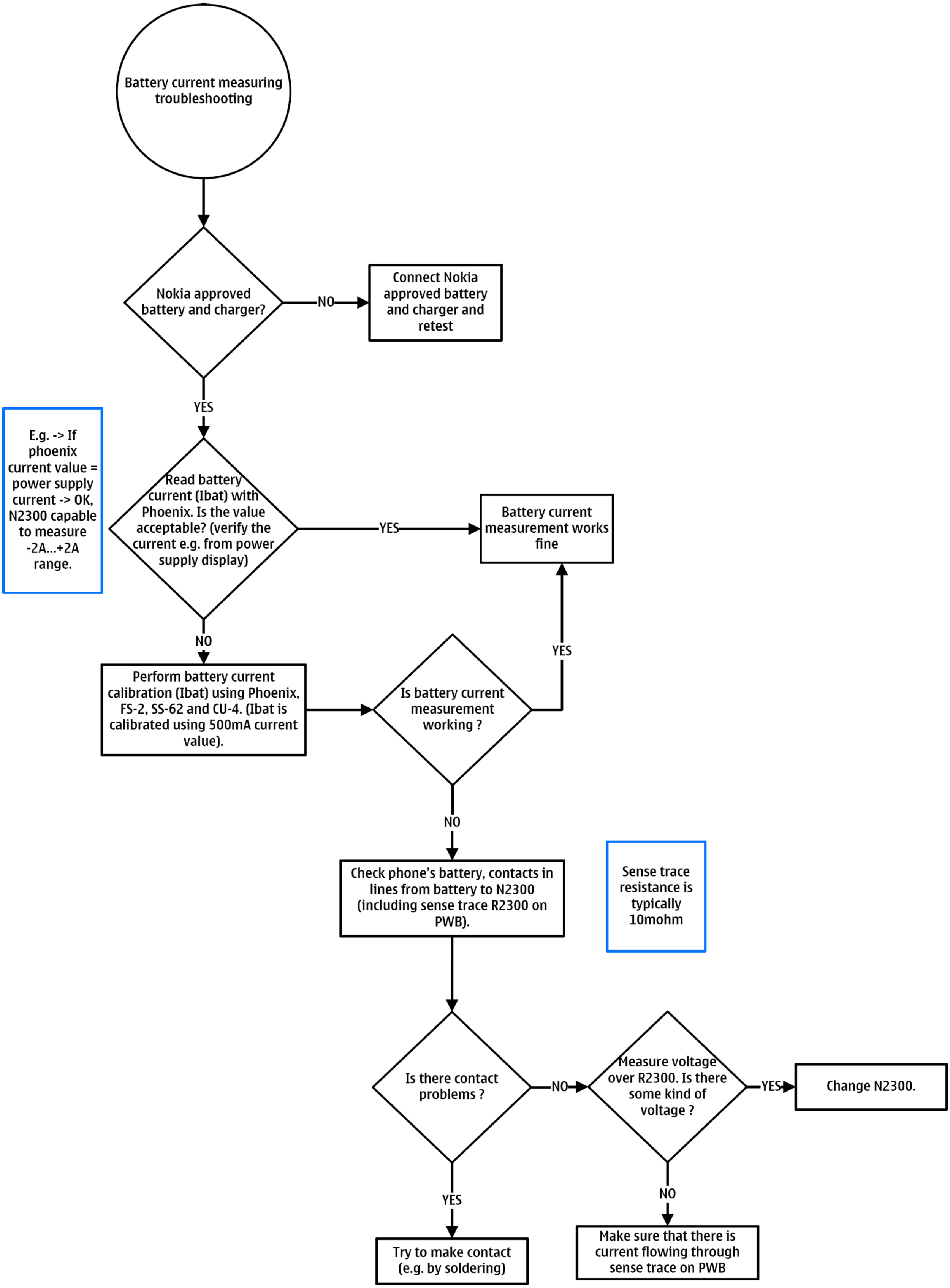
Charging troubleshooting

Troubleshooting flow


Charging does not work when Nokia approved charger is connected
Perform EM calibrations (e.g. battery voltage, charging current) and verify by Phoenix's ADC reading feature.
Charging OK ?
NO
Check with Phoenix ADC that BTEMP is OK. Is it between -30C and +85C.
NO
Check R2200 and C2202 and R2071 (NTC resistor)
YES
YES
Charging works fine
Measure Vchar line voltage when charger is connected (over C2000). Is it > 3.0Vdc ?
NO
Check X2000, X2001, F2000, L2000, V2000, C2000, C2001 and charging line connections from charger to N2300, (also short circuit possible)
Check also connections and serial components R2307 and V2301 in line from N2300 to battery connector
YES
Check charging current with Phoenix. Is it >100mA
YES
Flash the phone
NO
Does charging work with another battery? Or with another charger?
YES
END
NO
Is Vchar OK, when you read N2200 ADC with phoenix?
YES
Is Vchar OK at N2200 input (J2300)?
YES
Change N2200 and retest
NO
NO
Check battery connector
Change N2300 and retest

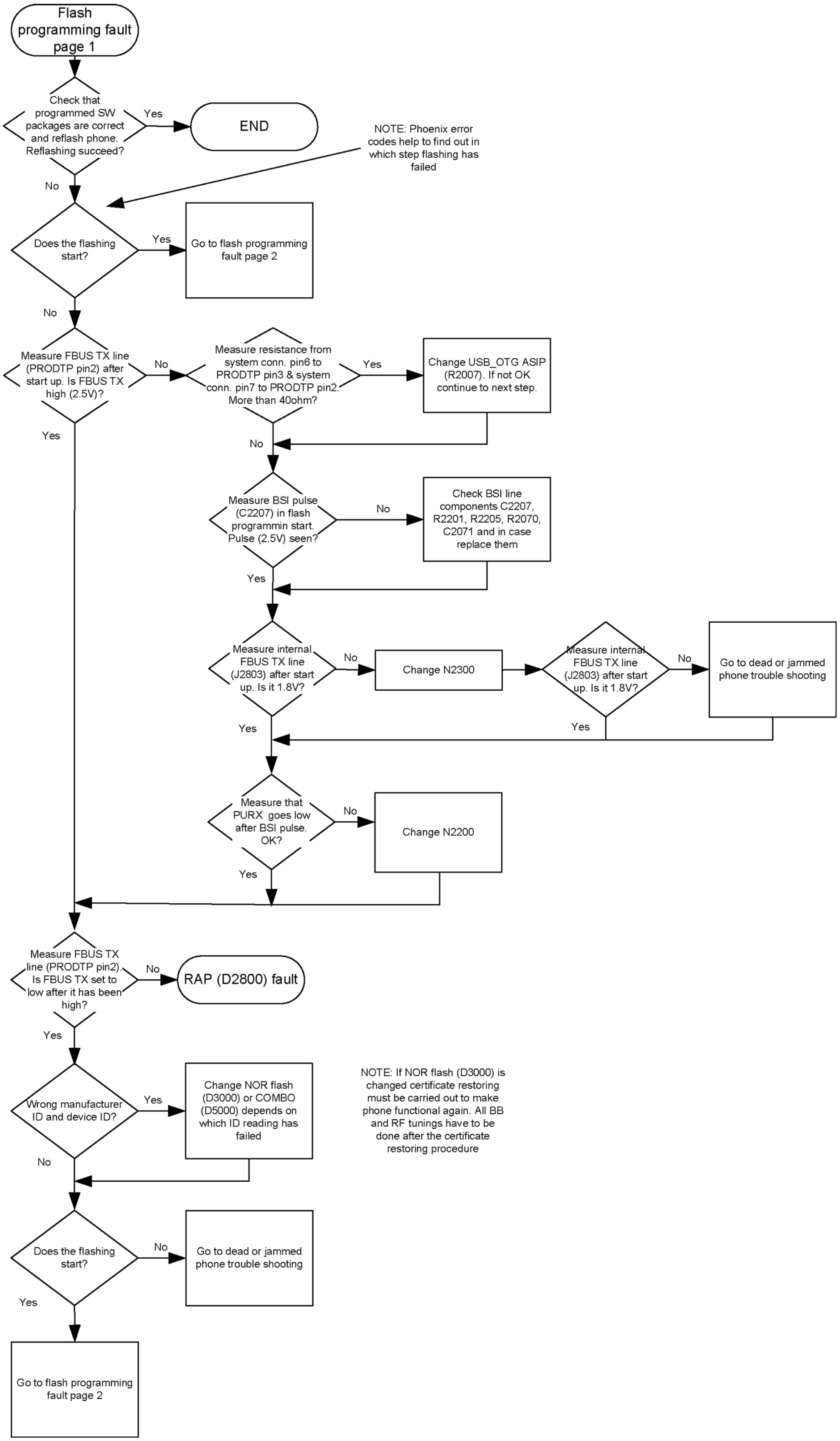
Battery current measuring fault troubleshooting

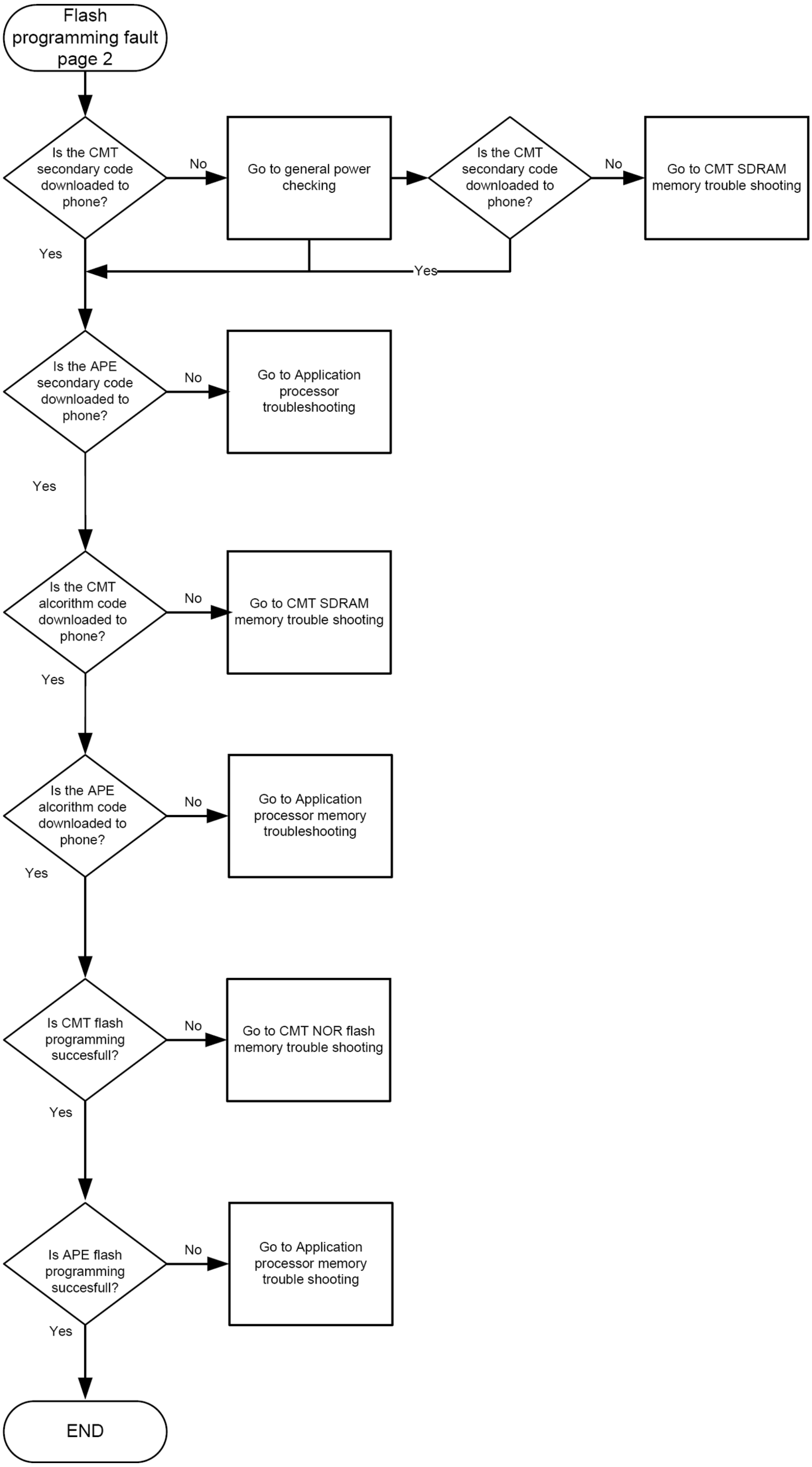
Troubleshooting flow


Battery current measuring troubleshooting
Nokia approved battery and charger?
NO
Connect Nokia approved battery and charger and retest
YES
E.g. -> If phoenix current value = power supply current -> OK, N2300 capable to measure -2A...+2A range.
Read battery current (Ibat) with Phoenix. Is the value acceptable? (verify the current e.g. from power supply display)
YES
Battery current measurement works fine
NO
Perform battery current calibration (Ibat) using Phoenix, FS-2, SS-62 and CU-4. (Ibat is calibrated using 500mA current value).
Is battery current measurement working ?
YES
NO
Check phone's battery, contacts in lines from battery to N2300 (including sense trace R2300 on PWB).
Sense trace resistance is typically 10mohm
Is there contact problems ?
NO
Measure voltage over R2300. Is there some kind of voltage ?
YES
Change N2300.
YES
Try to make contact (e.g. by soldering)
NO
Make sure that there is current flowing through sense trace on PWB

Flash programming fault troubleshooting

Troubleshooting flow


Flash programming fault page 1
Check that programmed SW packages are correct and reflash phone. Reflashing succeed?
Yes
END
NOTE: Phoenix error codes help to find out in which step flashing has failed
No
Does the flashing start?
Yes
Go to flash programming fault page 2
No
Measure FBUS TX line (PRODTP pin2) after start up. Is FBUS TX high (2.5V)?
No
Measure resistance from system conn. pin6 to PRODTP pin3 & system conn. pin7 to PRODTP pin2. More than 40ohm?
Yes
Change USB_OTG ASIP (R2007). If not OK continue to next step.
Yes
No
Measure BSI pulse (C2207) in flash programmin start. Pulse (2.5V) seen?
No
Check BSI line components C2207, R2201, R2205, R2070, C2071 and in case replace them
Yes
Measure internal FBUS TX line (J2803) after start up. Is it 1.8V?
No
Change N2300
Measure internal FBUS TX line (J2803) after start up. Is it 1.8V?
No
Go to dead or jammed phone trouble shooting
Yes
Yes
Measure that PURX goes low after BSI pulse. OK?
No
Change N2200
Yes
Measure FBUS TX line (PRODTP pin2). Is FBUS TX set to low after it has been high?
No
RAP (D2800) fault
Yes
Wrong manufacturer ID and device ID?
Yes
Change NOR flash (D3000) or COMBO (D5000) depends on which ID reading has failed
NOTE: If NOR flash (D3000) is changed certificate restoring must be carried out to make phone functional again. All BB and RF tunings have to be done after the certificate restoring procedure
No
Does the flashing start?
No
Go to dead or jammed phone trouble shooting
Yes
Go to flash programming fault page 2


Flash programming fault page 2
Is the CMT secondary code downloaded to phone?
No
Go to general power checking
Is the CMT secondary code downloaded to phone?
No
Go to CMT SDRAM memory trouble shooting
Yes
Yes
Is the APE secondary code downloaded to phone?
No
Go to Application processor troubleshooting
Yes
Is the CMT alcorithm code downloaded to phone?
No
Go to CMT SDRAM memory trouble shooting
Yes
Is the APE alcorithm code downloaded to phone?
No
Go to Application processor memory troubleshooting
Yes
Is CMT flash programming succesfull?
No
Go to CMT NOR flash memory trouble shooting
Yes
Is APE flash programming succesfull?
No
Go to Application processor memory trouble shooting
Yes
END

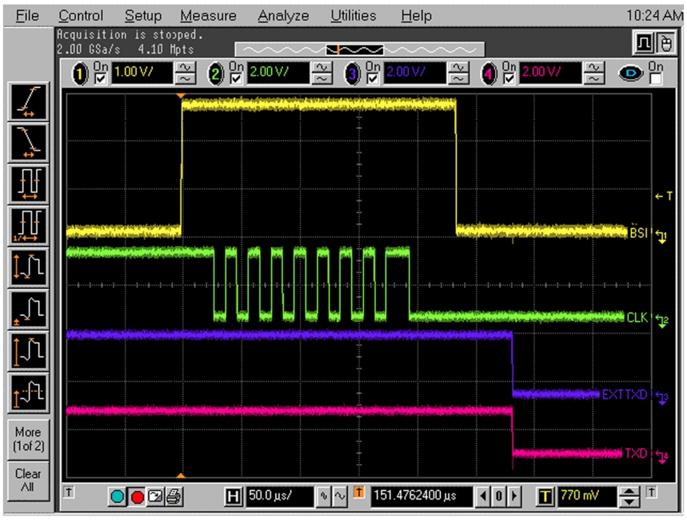

File Control Setup Measure Analyze Utilities Help
10:24 AM
Acquisition is stopped.
2.00 GSa/s 4.10 Mpts
1.00 V/
2.00 V/
2.00 V/
2.00 V/
BSI
CLK
EXTTXD
TXD
More (1of 2)
Clear All
50.0 µs/
151.4762400 µs
770 mV

Figure 40 Flashing pic 1. Take single trig measurement for the rise of the BSI signal.

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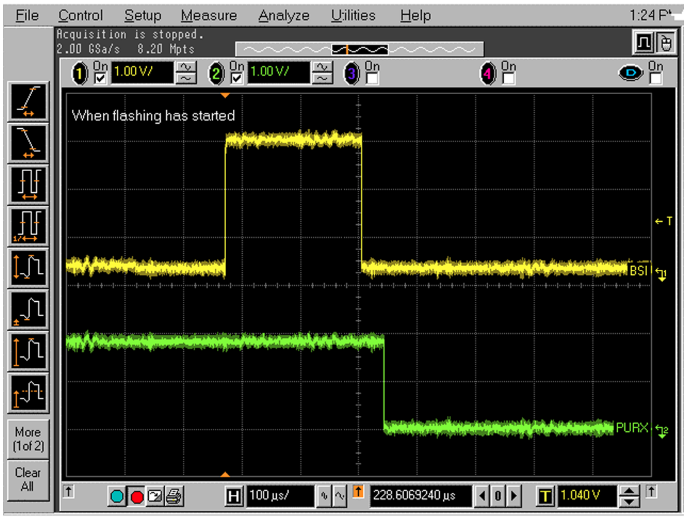
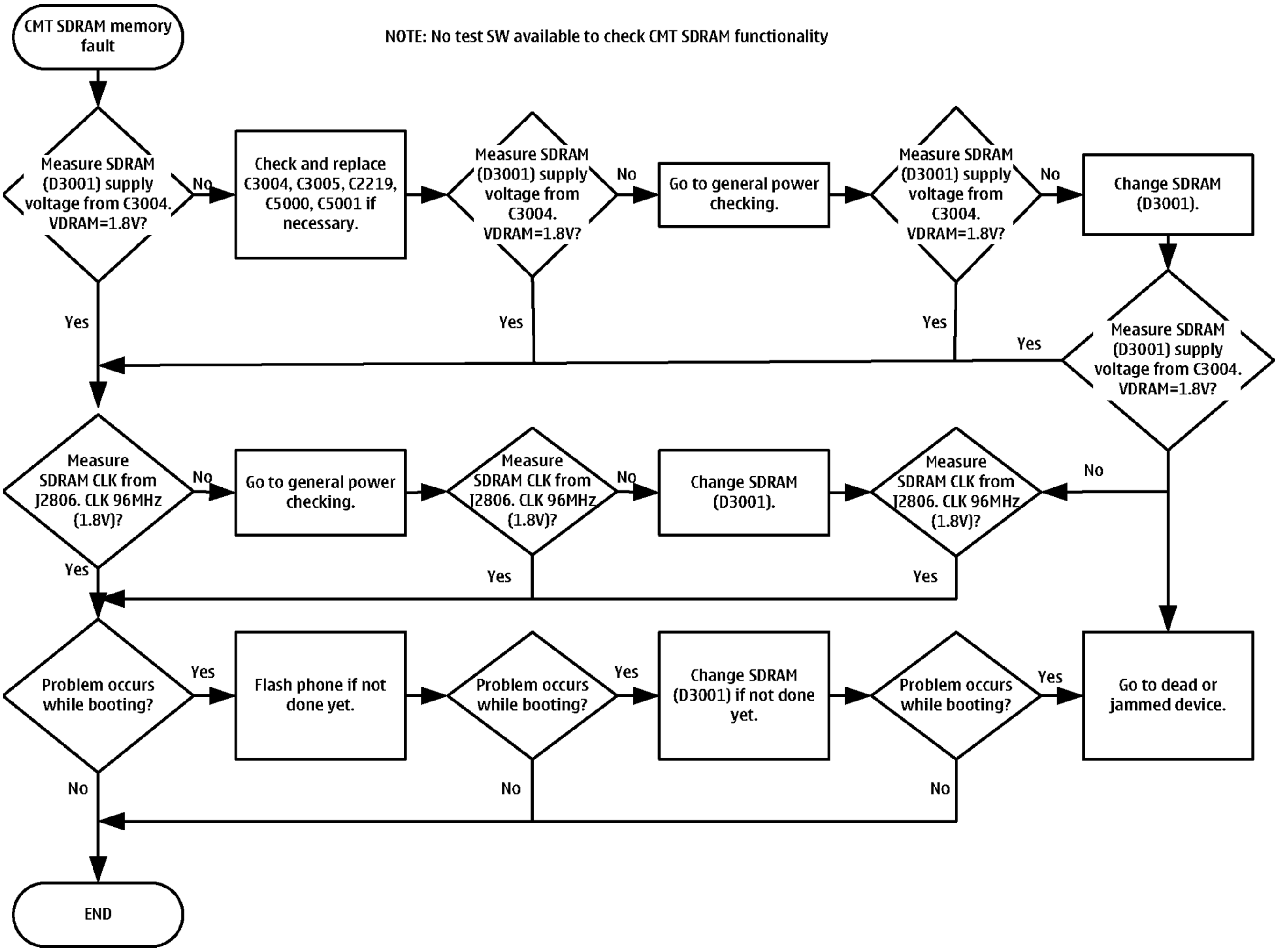

File Control Setup Measure Analyze Utilities Help
1:24 PM
Acquisition is stopped.
2.00 GSa/s 8.20 Mpts
1.00 V/
1.00 V/
When flashing has started
BSI
PURX
More (1of 2)
Clear All
100 µs/
228.6069240 µs
1.040 V

Figure 41 Flashing pic 2. Take single trig measurement for the rise of the BSI signal.

CMT SDRAM memory troubleshooting

Troubleshooting flow


CMT SDRAM memory fault
Measure SDRAM (D3001) supply voltage from C3004. VDRAM=1.8V?
No
Check and replace C3004, C3005, C2219, C5000, C5001 if necessary.
Measure SDRAM (D3001) supply voltage from C3004. VDRAM=1.8V?
No
Go to general power checking.
Measure SDRAM (D3001) supply voltage from C3004. VDRAM=1.8V?
No
Change SDRAM (D3001).
Yes
Yes
Yes
Yes
Measure SDRAM (D3001) supply voltage from C3004. VDRAM=1.8V?
Measure SDRAM CLK from J2806. CLK 96MHz (1.8V)?
No
Go to general power checking.
Measure SDRAM CLK from J2806. CLK 96MHz (1.8V)?
No
Change SDRAM (D3001).
Measure SDRAM CLK from J2806. CLK 96MHz (1.8V)?
No
Yes
Yes
Yes
Problem occurs while booting?
Yes
Flash phone if not done yet.
Problem occurs while booting?
Yes
Change SDRAM (D3001) if not done yet.
Problem occurs while booting?
Yes
Go to dead or jammed device.
No
No
No
END

NOTE: No test SW available to check CMT SDRAM functionality

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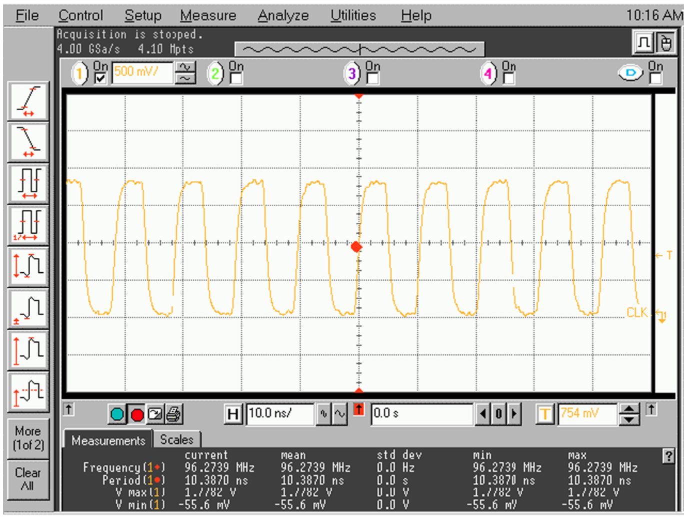

File
Control
Setup
Measure
Analyze
Utilities
Help
10:16 AM
On
500 mV/
On
On
On
On
More (1of 2)
Clear All
CLK
H
10.0 ns/
0.0 s
T
754 mV
Measurements
Scales

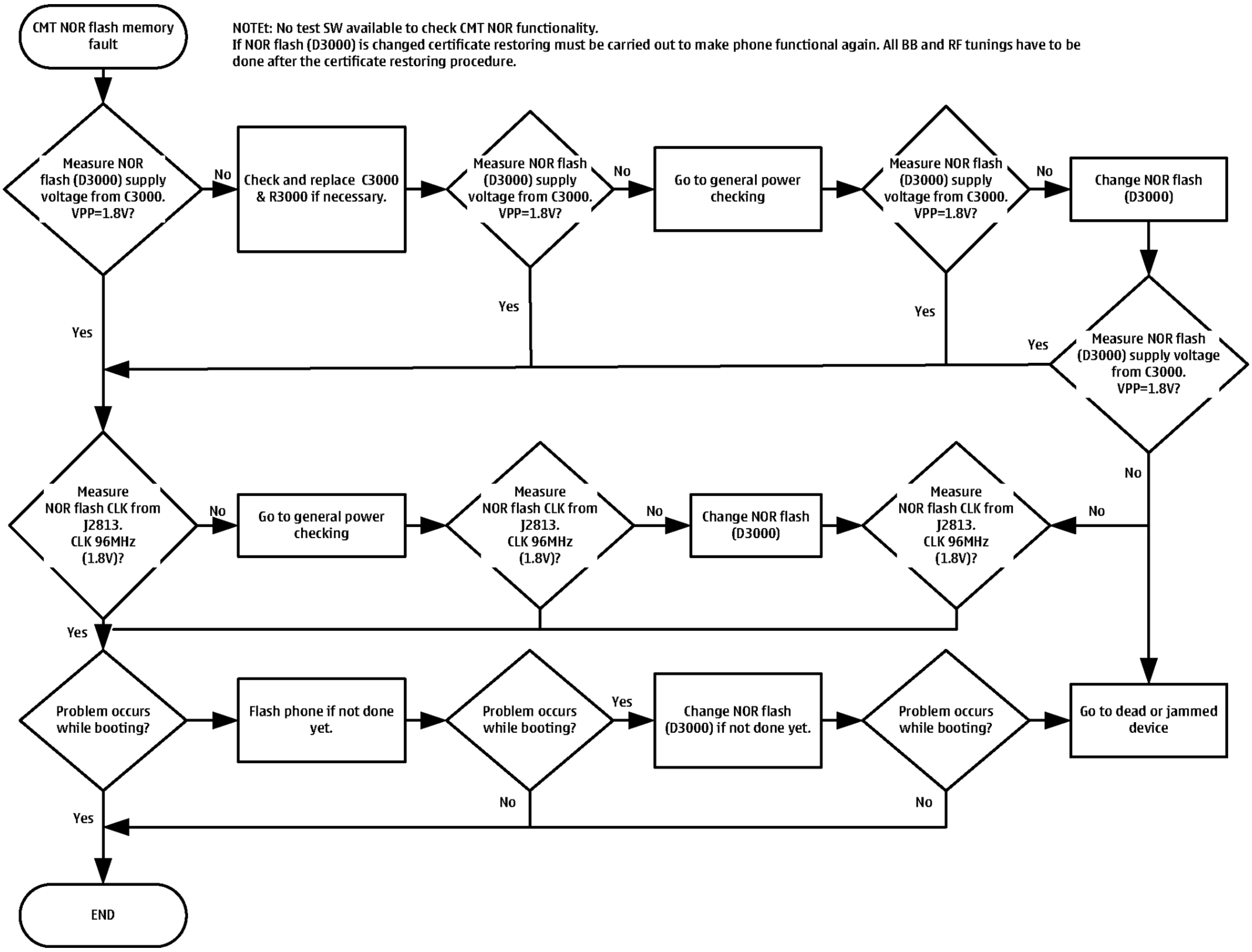
```
Acquisition is stopped.
4.00 GSa/s   4.10 Mpts
```

```
                current        mean          std dev     min           max
  Frequency(1)  96.2739 MHz    96.2739 MHz   0.0 Hz      96.2739 MHz   96.2739 MHz
     Period(1)  10.3870 ns     10.3870 ns    0.0 s       10.3870 ns    10.3870 ns
      V max(1)  1.7782 V       1.7782 V      0.0 V       1.7782 V      1.7782 V
      V min(1)  -55.6 mV       -55.6 mV      0.0 V       -55.6 mV      -55.6 mV
```

Figure 42 CMT SDRAM CLK from pin J2806

CMT NOR flash fault troubleshooting

Troubleshooting flow


CMT NOR flash memory fault
NOTEt: No test SW available to check CMT NOR functionality.
If NOR flash (D3000) is changed certificate restoring must be carried out to make phone functional again. All BB and RF tunings have to be done after the certificate restoring procedure.
Measure NOR flash (D3000) supply voltage from C3000. VPP=1.8V?
No
Check and replace C3000 & R3000 if necessary.
Measure NOR flash (D3000) supply voltage from C3000. VPP=1.8V?
No
Go to general power checking
Measure NOR flash (D3000) supply voltage from C3000. VPP=1.8V?
No
Change NOR flash (D3000)
Yes
Yes
Yes
Yes
Measure NOR flash (D3000) supply voltage from C3000. VPP=1.8V?
No
Measure NOR flash CLK from J2813. CLK 96MHz (1.8V)?
No
Go to general power checking
Measure NOR flash CLK from J2813. CLK 96MHz (1.8V)?
No
Change NOR flash (D3000)
Measure NOR flash CLK from J2813. CLK 96MHz (1.8V)?
No
Yes
Problem occurs while booting?
Flash phone if not done yet.
Problem occurs while booting?
Yes
Change NOR flash (D3000) if not done yet.
Problem occurs while booting?
Go to dead or jammed device
No
No
Yes
END

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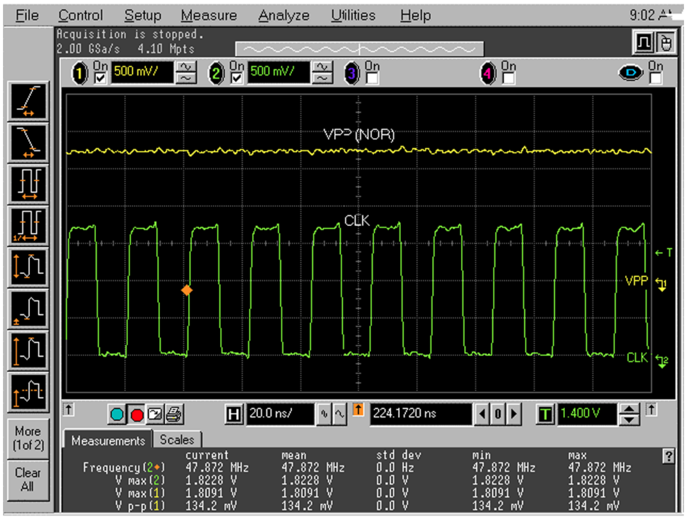


```
Acquisition is stopped.
2.00 GSa/s   4.10 Mpts
```

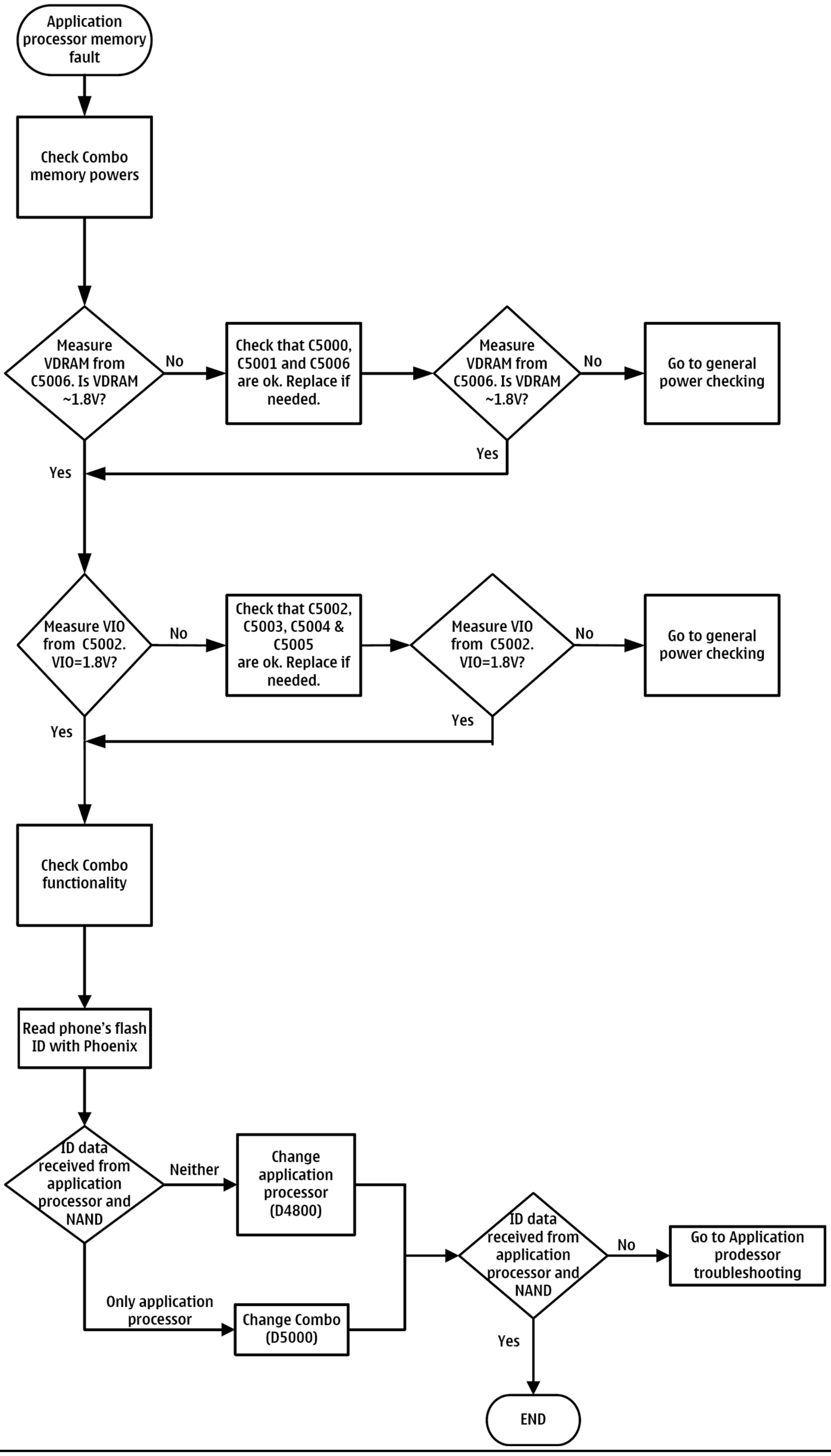
File
Control
Setup
Measure
Analyze
Utilities
Help
9:02 A
1 On 500 mV/
2 On 500 mV/
3 On
4 On
D On
VPP (NOR)
CLK
T
VPP
CLK
More (1of 2)
Clear All
H 20.0 ns/
224.1720 ns
0
T 1.400 V
Measurements
Scales

```
                current      mean         std dev     min          max
Frequency(2◆)   47.872 MHz   47.872 MHz   0.0 Hz      47.872 MHz   47.872 MHz
     V max(2)   1.8228 V     1.8228 V     0.0 V       1.8228 V     1.8228 V
     V max(1)   1.8091 V     1.8091 V     0.0 V       1.8091 V     1.8091 V
     V p-p(1)   134.2 mV     134.2 mV     0.0 V       134.2 mV     134.2 mV
```

Figure 43 NOR CLK from J2813

Application processor memory troubleshooting

Troubleshooting flow


Application processor memory fault
Check Combo memory powers
Measure VDRAM from C5006. Is VDRAM ~1.8V?
No
Check that C5000, C5001 and C5006 are ok. Replace if needed.
Measure VDRAM from C5006. Is VDRAM ~1.8V?
No
Go to general power checking
Yes
Yes
Measure VIO from C5002. VIO=1.8V?
No
Check that C5002, C5003, C5004 & C5005 are ok. Replace if needed.
Measure VIO from C5002. VIO=1.8V?
No
Go to general power checking
Yes
Yes
Check Combo functionality
Read phone's flash ID with Phoenix
ID data received from application processor and NAND
Neither
Change application processor (D4800)
Only application processor
Change Combo (D5000)
ID data received from application processor and NAND
No
Go to Application prodessor troubleshooting
Yes
END

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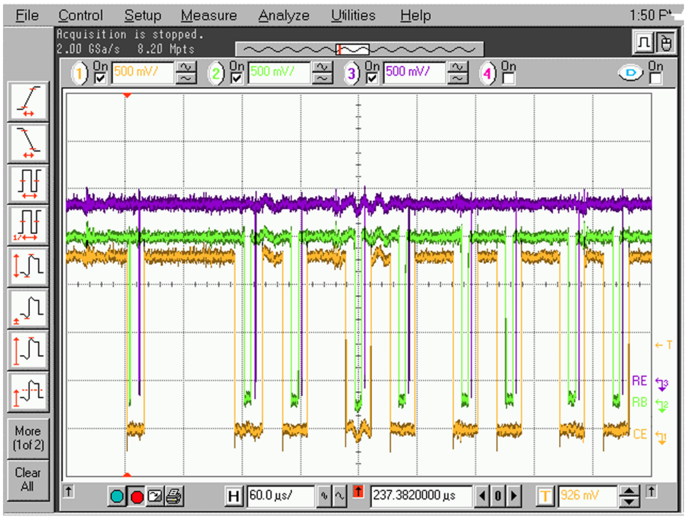
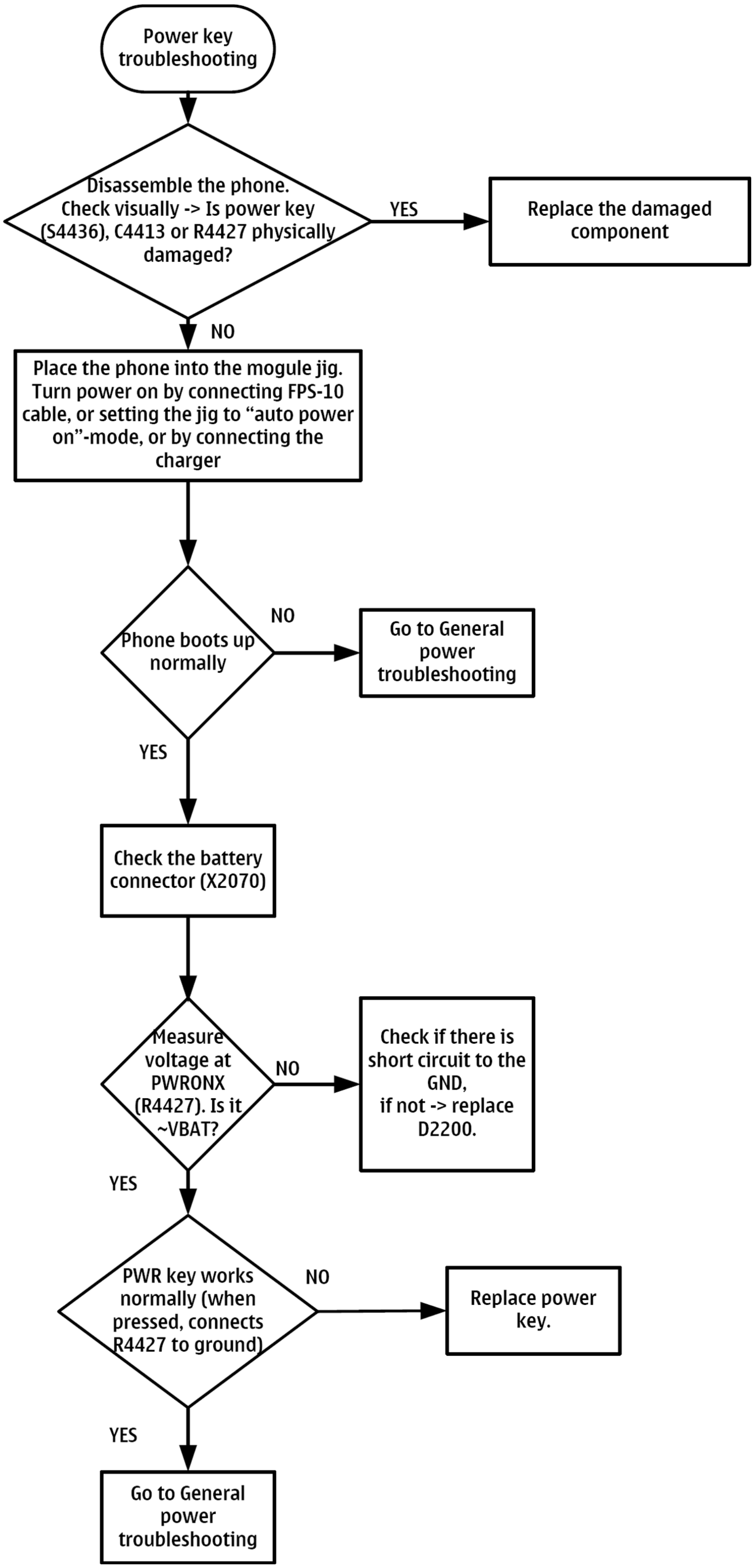

File
Control
Setup
Measure
Analyze
Utilities
Help
1:50 P
Acquisition is stopped.
2.00 GSa/s 8.20 Mpts
500 mV/
500 mV/
500 mV/
More (1of 2)
Clear All
RE
RB
CE
T
60.0 µs/
237.3820000 µs
926 mV

Take single trig measurement on the falling edge of the CE signal.

Figure 44 COMBO NAND in boot pic 1.

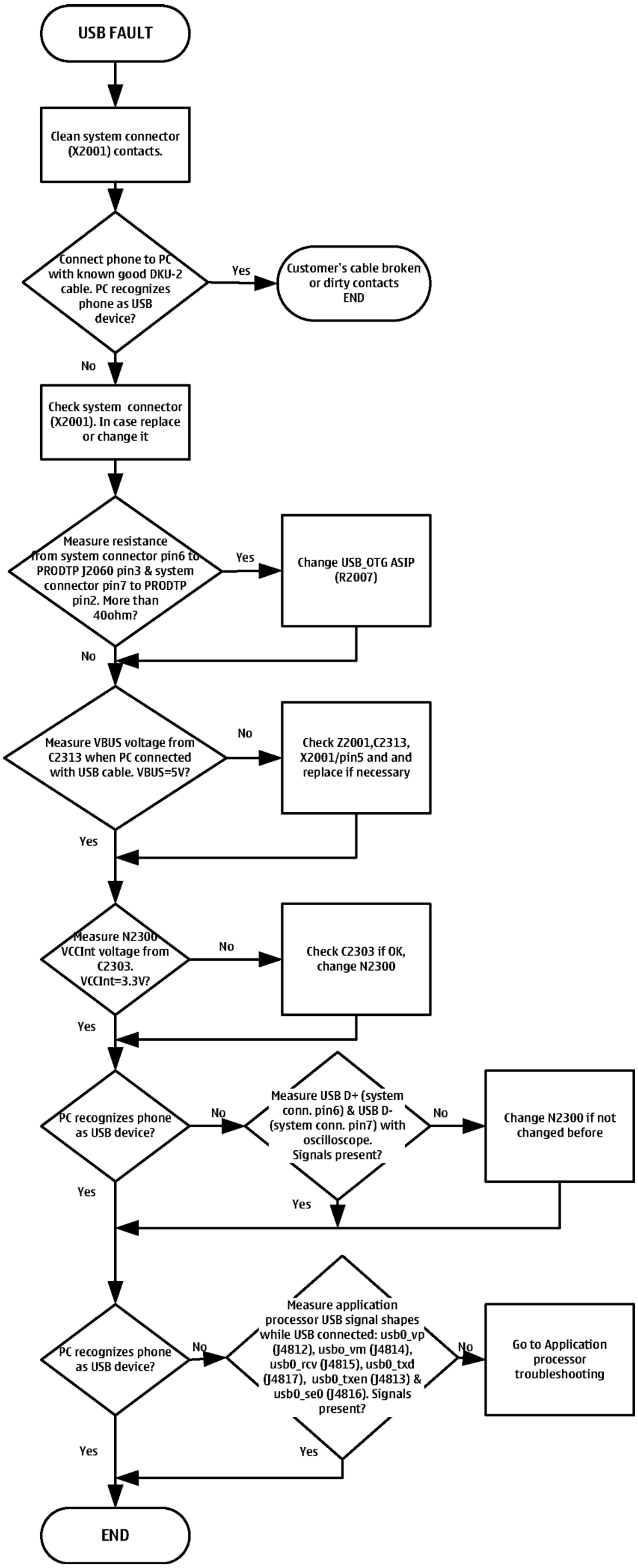
Power key troubleshooting

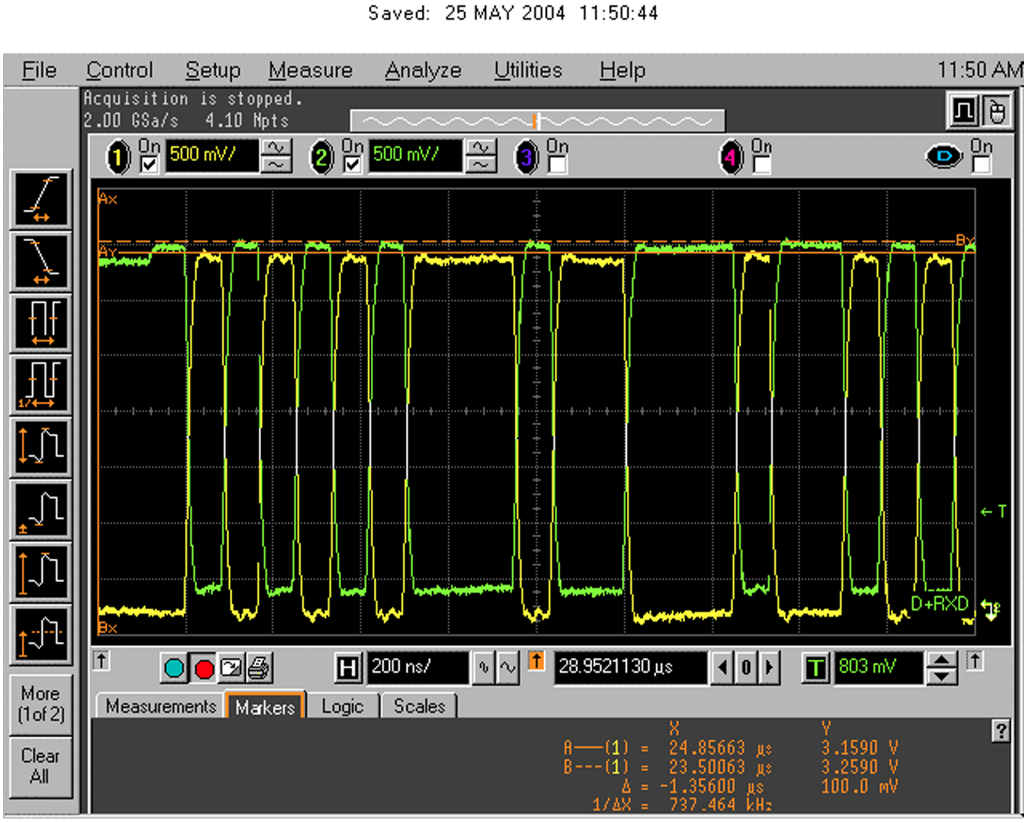
Troubleshooting flow


Power key troubleshooting
Disassemble the phone. Check visually -> Is power key (S4436), C4413 or R4427 physically damaged?
YES
Replace the damaged component
NO
Place the phone into the mogule jig. Turn power on by connecting FPS-10 cable, or setting the jig to "auto power on"-mode, or by connecting the charger
Phone boots up normally
NO
Go to General power troubleshooting
YES
Check the battery connector (X2070)
Measure voltage at PWRONX (R4427). Is it ~VBAT?
NO
Check if there is short circuit to the GND, if not -> replace D2200.
YES
PWR key works normally (when pressed, connects R4427 to ground)
NO
Replace power key.
YES
Go to General power troubleshooting

USB interface troubleshooting

Troubleshooting flow


USB FAULT
Clean system connector (X2001) contacts.
Connect phone to PC with known good DKU-2 cable. PC recognizes phone as USB device?
Yes
Customer's cable broken or dirty contacts END
No
Check system connector (X2001). In case replace or change it
Measure resistance from system connector pin6 to PRODTP J2060 pin3 & system connector pin7 to PRODTP pin2. More than 40ohm?
Yes
Change USB_OTG ASIP (R2007)
No
Measure VBUS voltage from C2313 when PC connected with USB cable. VBUS=5V?
No
Check Z2001,C2313, X2001/pin5 and and replace if necessary
Yes
Measure N2300 VCCInt voltage from C2303. VCCInt=3.3V?
No
Check C2303 if OK, change N2300
Yes
PC recognizes phone as USB device?
No
Measure USB D+ (system conn. pin6) & USB D- (system conn. pin7) with oscilloscope. Signals present?
No
Change N2300 if not changed before
Yes
Yes
PC recognizes phone as USB device?
No
Measure application processor USB signal shapes while USB connected: usb0_vp (J4812), usbo_vm (J4814), usb0_rcv (J4815), usb0_txd (J4817), usb0_txen (J4813) & usb0_se0 (J4816). Signals present?
No
Go to Application processor troubleshooting
Yes
Yes
END



```
Saved:  25 MAY 2004  11:50:44
```

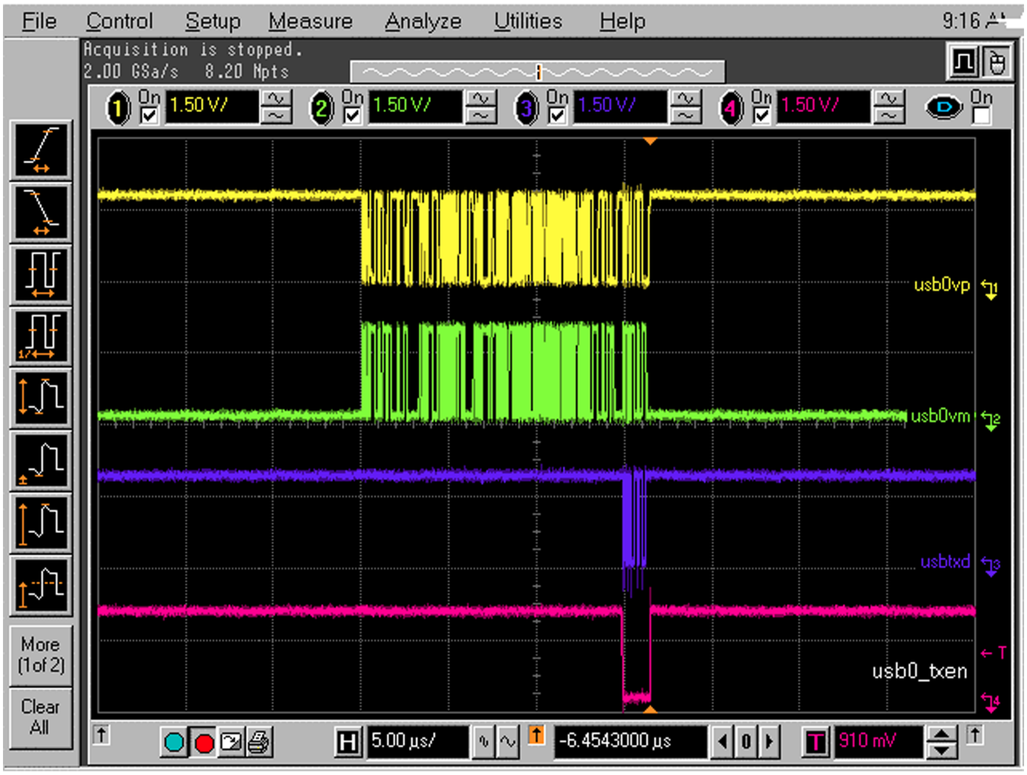
```
Acquisition is stopped.
2.00 GSa/s    4.10 Mpts
```

```
              X                  Y
A——(1) =   24.85663 µs        3.1590 V
B---(1) =  23.50063 µs        3.2590 V
      Δ = -1.35600 µs        100.0 mV
   1/ΔX =  737.464 kHz
```

File
Control
Setup
Measure
Analyze
Utilities
Help
11:50 AM
1
On
☑
500 mV/
2
On
☑
500 mV/
3
On
☐
4
On
☐
D
On
☐
Ax
Ay
Bx
By
← T
D+RXD
More (1 of 2)
Clear All
H
200 ns/
28.9521130 µs
0
T
803 mV
Measurements
Markers
Logic
Scales
?

Figure 45 USB 1: D-TXD (system connector pin6) and D+RXD (system connector pin7) voltage levels when USB connected.

Saved: 06 JUL 2004 09:16:02



Acquisition is stopped.
2.00 GSa/s 8.20 Mpts

1 On ☑ 1.50 V/
2 On ☑ 1.50 V/
3 On ☑ 1.50 V/
4 On ☑ 1.50 V/
D On ☐

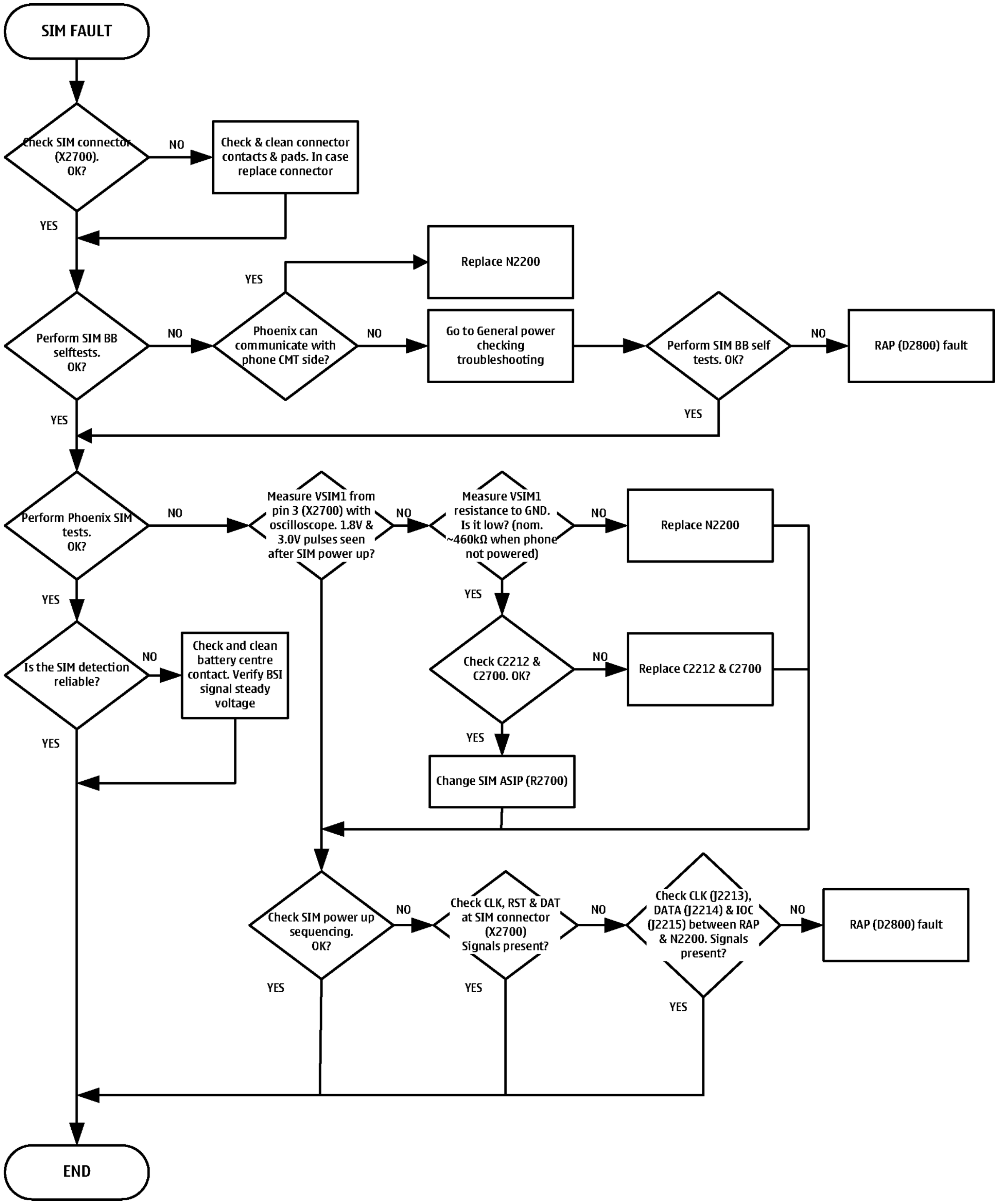
H 5.00 µs/
-6.4543000 µs
T 910 mV

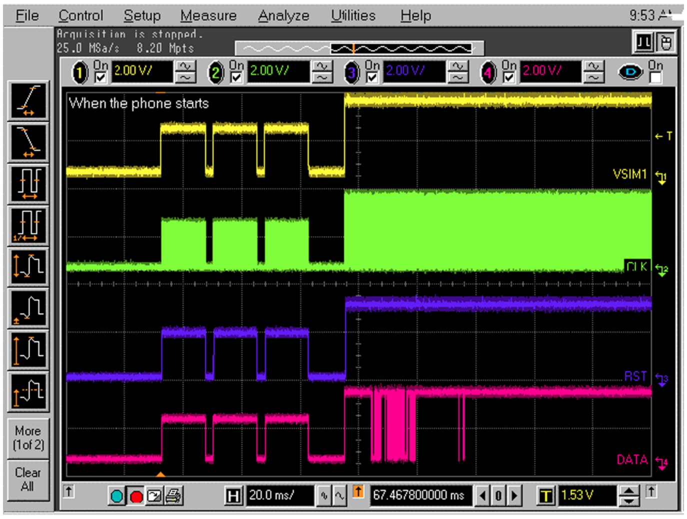
File
Control
Setup
Measure
Analyze
Utilities
Help
9:16 AM
usb0vp
usb0vm
usbtxd
usb0_txen
T
More (1of 2)
Clear All

Figure 46 USB 2: Take single triggered measurement on the rising edge of the Helen usb0_txen (J4813) line.

SIM card troubleshooting

Troubleshooting flow


SIM FAULT
Check SIM connector (X2700). OK?
NO
Check & clean connector contacts & pads. In case replace connector
YES
Replace N2200
YES
Perform SIM BB selftests. OK?
NO
Phoenix can communicate with phone CMT side?
NO
Go to General power checking troubleshooting
Perform SIM BB self tests. OK?
NO
RAP (D2800) fault
YES
YES
Perform Phoenix SIM tests. OK?
NO
Measure VSIM1 from pin 3 (X2700) with oscilloscope. 1.8V & 3.0V pulses seen after SIM power up?
NO
Measure VSIM1 resistance to GND. Is it low? (nom. ~460kΩ when phone not powered)
NO
Replace N2200
YES
YES
Is the SIM detection reliable?
NO
Check and clean battery centre contact. Verify BSI signal steady voltage
Check C2212 & C2700. OK?
NO
Replace C2212 & C2700
YES
YES
Change SIM ASIP (R2700)
Check SIM power up sequencing. OK?
NO
Check CLK, RST & DAT at SIM connector (X2700) Signals present?
NO
Check CLK (J2213), DATA (J2214) & IOC (J2215) between RAP & N2200. Signals present?
NO
RAP (D2800) fault
YES
YES
YES
END

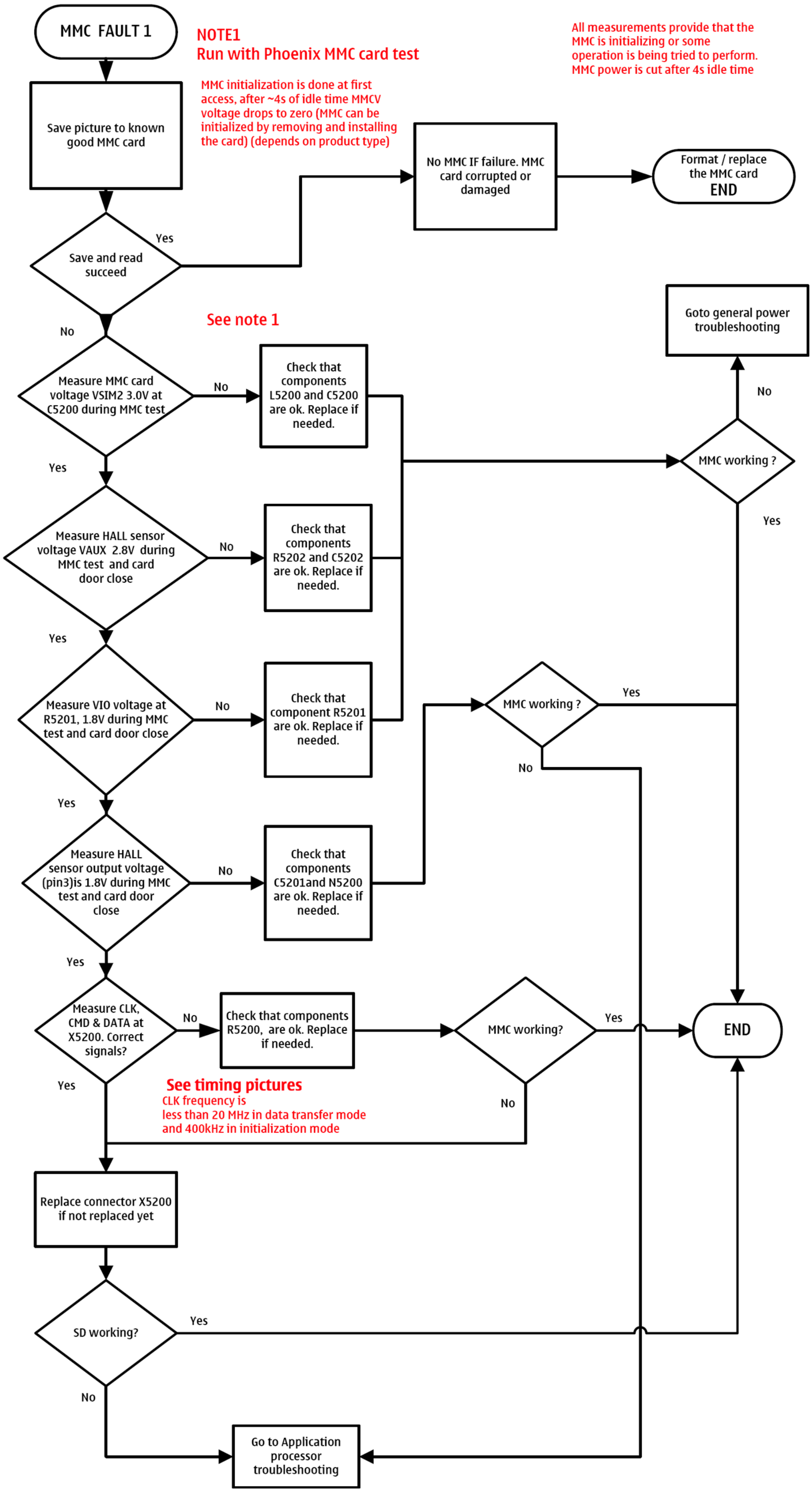

File
Control
Setup
Measure
Analyze
Utilities
Help
9:53 AM
Acquisition is stopped.
25.0 MSa/s 8.20 Mpts
On 2.00 V/
On 2.00 V/
On 2.00 V/
On 2.00 V/
On
When the phone starts
VSIM1
CLK
RST
DATA
T
More (1of 2)
Clear All
20.0 ms/
67.467800000 ms
1.53 V

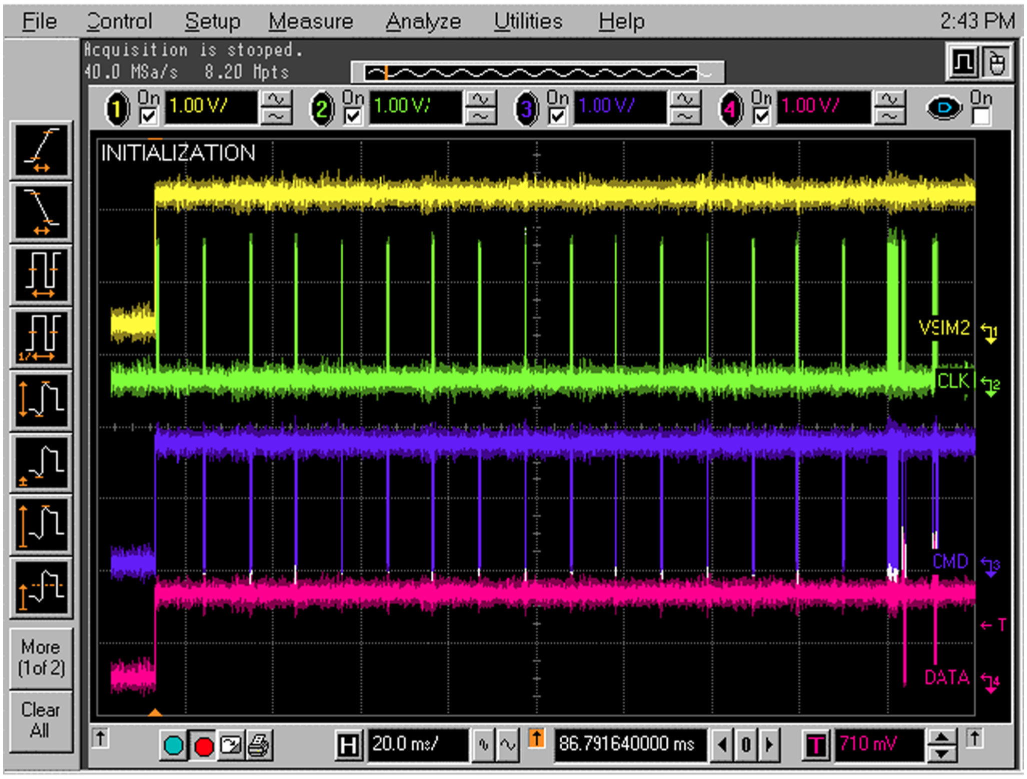
SIM CLK frequency = 3.2MHz (Take single triggered measurement in boot on the VSIM1 line).

Figure 47 SIM interface signals

MMC troubleshooting

Troubleshooting flow

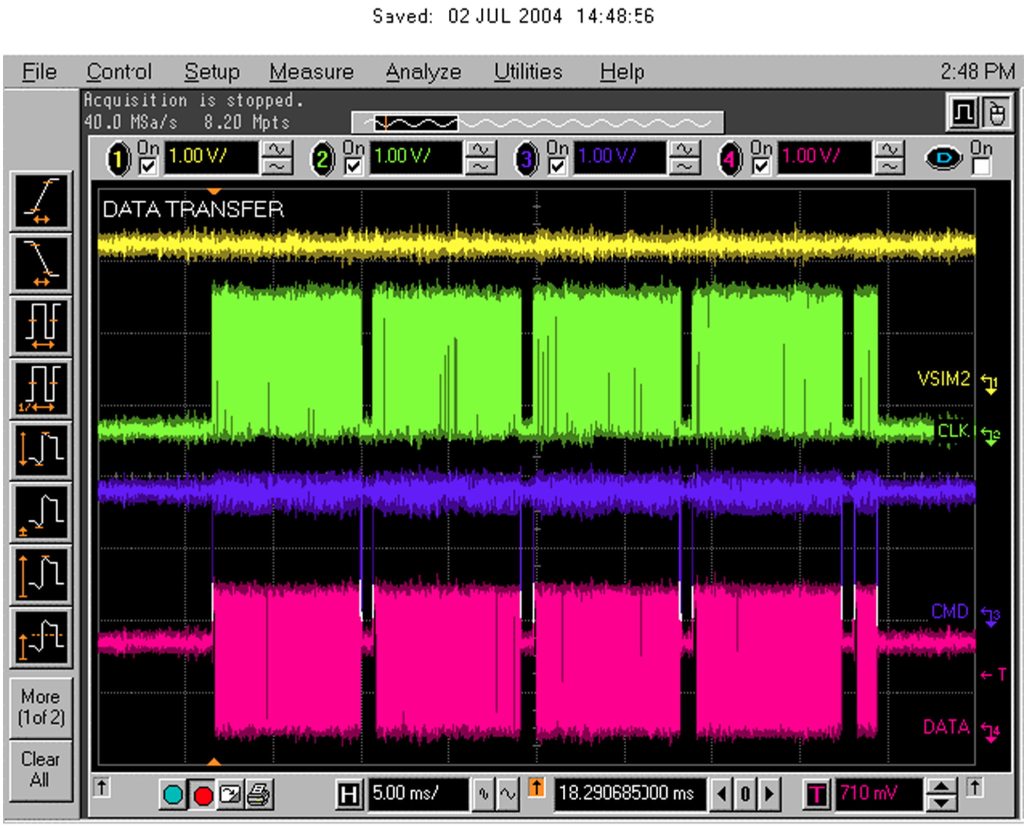

MMC FAULT 1
NOTE1
Run with Phoenix MMC card test
All measurements provide that the MMC is initializing or some operation is being tried to perform. MMC power is cut after 4s idle time
Save picture to known good MMC card
MMC initialization is done at first access, after ~4s of idle time MMCV voltage drops to zero (MMC can be initialized by removing and installing the card) (depends on product type)
No MMC IF failure. MMC card corrupted or damaged
Format / replace the MMC card
END
Yes
Save and read succeed
No
See note 1
Goto general power troubleshooting
Measure MMC card voltage VSIM2 3.0V at C5200 during MMC test
No
Check that components L5200 and C5200 are ok. Replace if needed.
No
MMC working ?
Yes
Yes
Measure HALL sensor voltage VAUX 2.8V during MMC test and card door close
No
Check that components R5202 and C5202 are ok. Replace if needed.
Yes
Measure VIO voltage at R5201, 1.8V during MMC test and card door close
No
Check that component R5201 are ok. Replace if needed.
MMC working ?
Yes
No
Yes
Measure HALL sensor output voltage (pin3)is 1.8V during MMC test and card door close
No
Check that components C5201and N5200 are ok. Replace if needed.
Yes
Measure CLK, CMD & DATA at X5200. Correct signals?
No
Check that components R5200, are ok. Replace if needed.
MMC working?
Yes
END
Yes
See timing pictures
CLK frequency is less than 20 MHz in data transfer mode and 400kHz in initialization mode
No
Replace connector X5200 if not replaced yet
SD working?
Yes
No
Go to Application processor troubleshooting


File
Control
Setup
Measure
Analyze
Utilities
Help
2:43 PM
1 On 1.00 V/
2 On 1.00 V/
3 On 1.00 V/
4 On 1.00 V/
On
INITIALIZATION
VSIM2
CLK
CMD
T
DATA
More (1 of 2)
Clear All
H 20.0 ms/
86.791640000 ms
0
T 710 mV

Acquisition is stopped.
40.0 MSa/s 8.20 Mpts

Take singe trig measurement on the rising edge of the DAT signal.

Figure 48 MMC card initialization



Saved: 02 JUL 2004 14:48:56

Acquisition is stopped.
40.0 MSa/s 8.20 Mpts

File
Control
Setup
Measure
Analyze
Utilities
Help
2:48 PM
1 On 1.00 V/
2 On 1.00 V/
3 On 1.00 V/
4 On 1.00 V/
On
DATA TRANSFER
VSIM2
CLK
CMD
T
DATA
More (1of 2)
Clear All
H 5.00 ms/
18.290685000 ms
T 710 mV

Take single trig measurement on the rising edge of the DAT signal.

Figure 49 Data transfer

Keyboard, sidekey and joystick troubleshooting

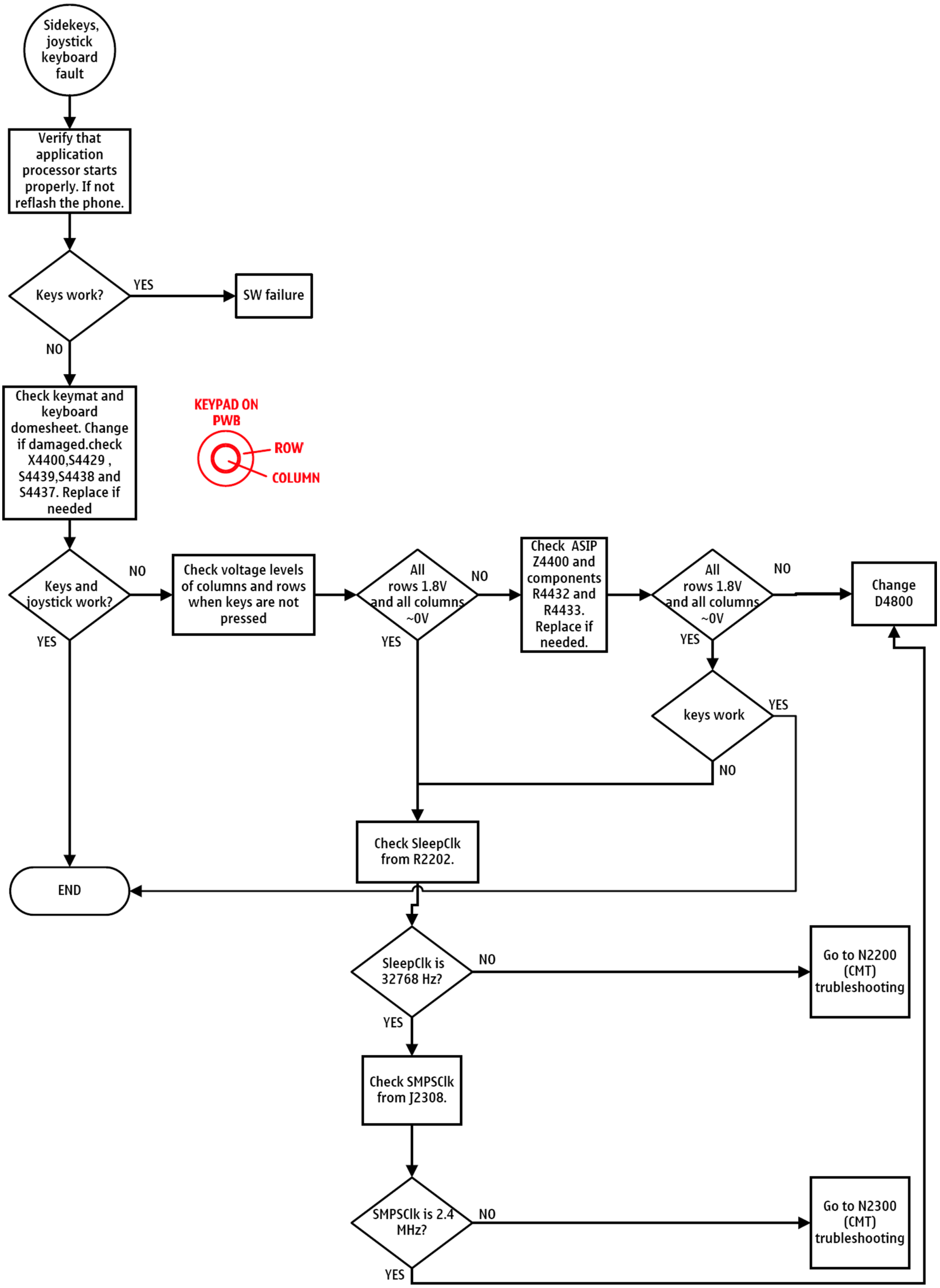
Context

There are two possible failure modes in the keyboard module:

- One or more keys can be stuck, so that the key does not react when a keydome is pressed. This kind of failure is caused by mechanical reasons (dirt, corrosion).
- Malfunction of several keys at the same time; this happens when one or more rows or columns are faulty (shortcut or open connection). For a more detailed description of the keyboard and keymatrix, see section **Keyboard** in **System Module**.

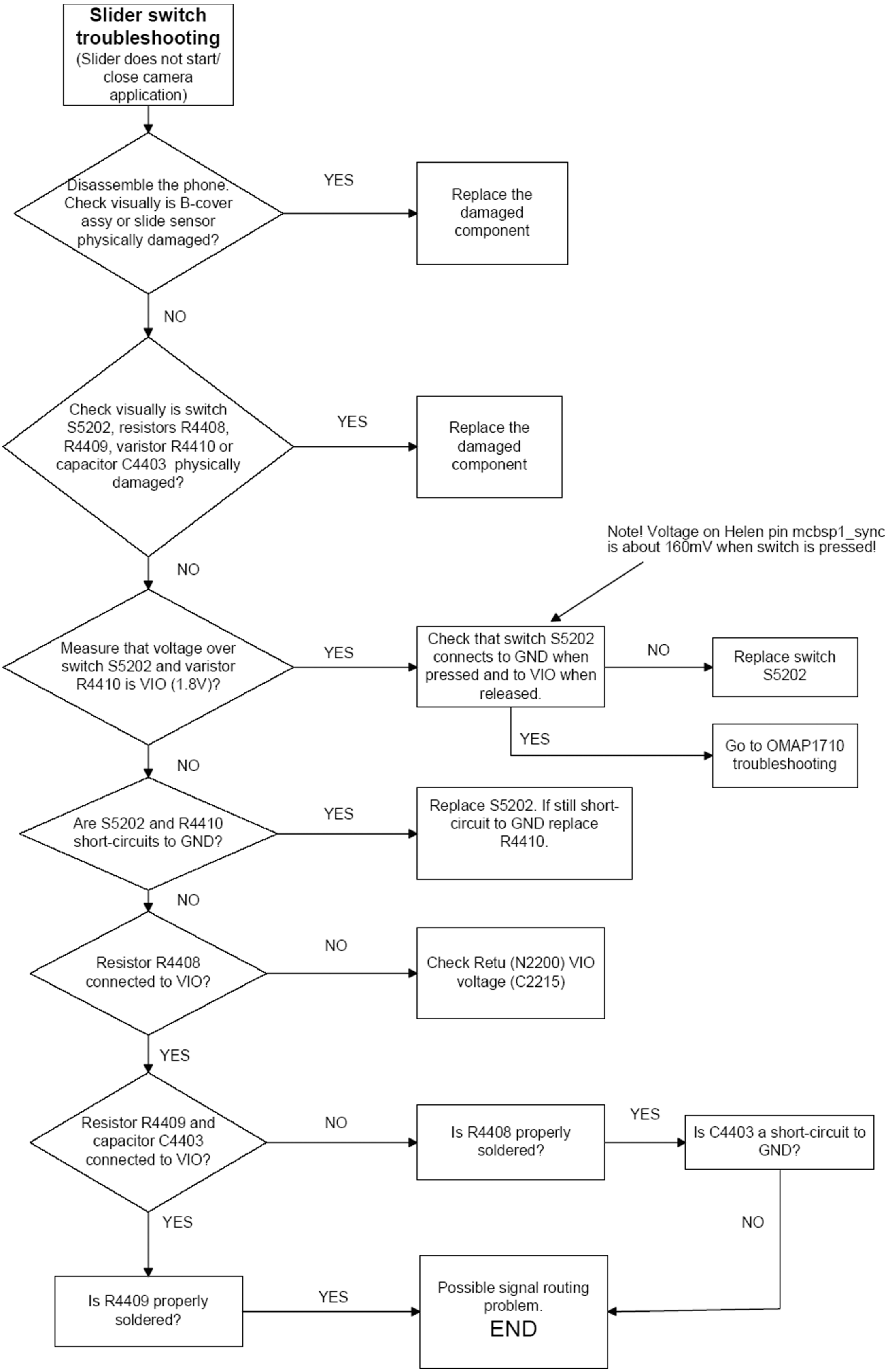
If the failure mode is not clear, start with the **Keyboard Test** in *Phoenix*.

Troubleshooting flow


Sidekeys, joystick keyboard fault
Verify that application processor starts properly. If not reflash the phone.
Keys work?
YES
SW failure
NO
Check keymat and keyboard domesheet. Change if damaged.check X4400,S4429 , S4439,S4438 and S4437. Replace if needed
KEYPAD ON PWB
ROW
COLUMN
Keys and joystick work?
NO
YES
Check voltage levels of columns and rows when keys are not pressed
All rows 1.8V and all columns ~0V
NO
YES
Check ASIP Z4400 and components R4432 and R4433. Replace if needed.
All rows 1.8V and all columns ~0V
NO
YES
Change D4800
keys work
YES
NO
Check SleepClk from R2202.
END
SleepClk is 32768 Hz?
NO
YES
Go to N2200 (CMT) trubleshooting
Check SMPSClk from J2308.
SMPSClk is 2.4 MHz?
NO
YES
Go to N2300 (CMT) trubleshooting

Slider switch troubleshooting

Troubleshooting flow


Slider switch troubleshooting (Slider does not start/ close camera application)
Disassemble the phone. Check visually is B-cover assy or slide sensor physically damaged?
YES
Replace the damaged component
NO
Check visually is switch S5202, resistors R4408, R4409, varistor R4410 or capacitor C4403 physically damaged?
YES
Replace the damaged component
NO
Note! Voltage on Helen pin mcbsp1_sync is about 160mV when switch is pressed!
Measure that voltage over switch S5202 and varistor R4410 is VIO (1.8V)?
YES
Check that switch S5202 connects to GND when pressed and to VIO when released.
NO
Replace switch S5202
YES
Go to OMAP1710 troubleshooting
NO
Are S5202 and R4410 short-circuits to GND?
YES
Replace S5202. If still short-circuit to GND replace R4410.
NO
Resistor R4408 connected to VIO?
NO
Check Retu (N2200) VIO voltage (C2215)
YES
Resistor R4409 and capacitor C4403 connected to VIO?
NO
Is R4408 properly soldered?
YES
Is C4403 a short-circuit to GND?
NO
YES
Is R4409 properly soldered?
YES
Possible signal routing problem. END

Certificate restoring for BB5.0 products

Context

This procedure is performed when the device certificate is corrupted for some reason.

All tunings (RF & Baseband, UI) must be done after performing the certificate restoring procedure.

The procedure for certificate restoring is the following:

- Flash the phone with the latest available software using FPS-8 or FPS-10.

  Note: USB flashing does not work for a dead BB5.0 phone.
- Create a request file.
- Send the file to Nokia by e-mail. Use the following addresses depending on your location:
  - APAC: sydney.service@nokia.com
  - CHINA: repair.ams@nokia.com
  - E&A: salo.repair@nokia.com
  - AMERICAS: fls1.usa@nokia.com
- When you receive a reply from Nokia, carry out certificate restoring.
- Tune the phone completely.

  Note: SX-4 smart card is needed.
- If the phone resets after certificate restoring, reflash the phone again.

Required equipment and setup:

- *Phoenix* service software v 2004.39.7.70 or newer.
- The latest phone model specific *Phoenix* data package.
- PKD-1 dongle
- SX-4 smart card (Enables BB5.0 testing and tuning features)
- External smart card reader

  Note: The smart card reader is only needed when FPS-8 is used. FPS-10 has an integrated smart card reader.
- Activated FPS-8 flash prommer **OR** FPS-10 flash prommer
- Flash update package 03.18.004 or newer for FPS-8 or FPS-10 flash prommers
- CU-4 control unit
- USB cable from PC USB Port to CU-4 control unit
- Phone model specific adapter for CU-4 control unit
- PCS-1 cable to power CU-4 from external power supply
- XCS-4 modular cable between flash prommer and CU-4

  Note: CU-4 must be supplied with +12 V from an external power supply in all steps of certificate restoring.

Steps

1. Program the phone software.

   i Start *Phoenix* and login. Make sure the connection has been managed correctly for FPS-8 or FPS-10.

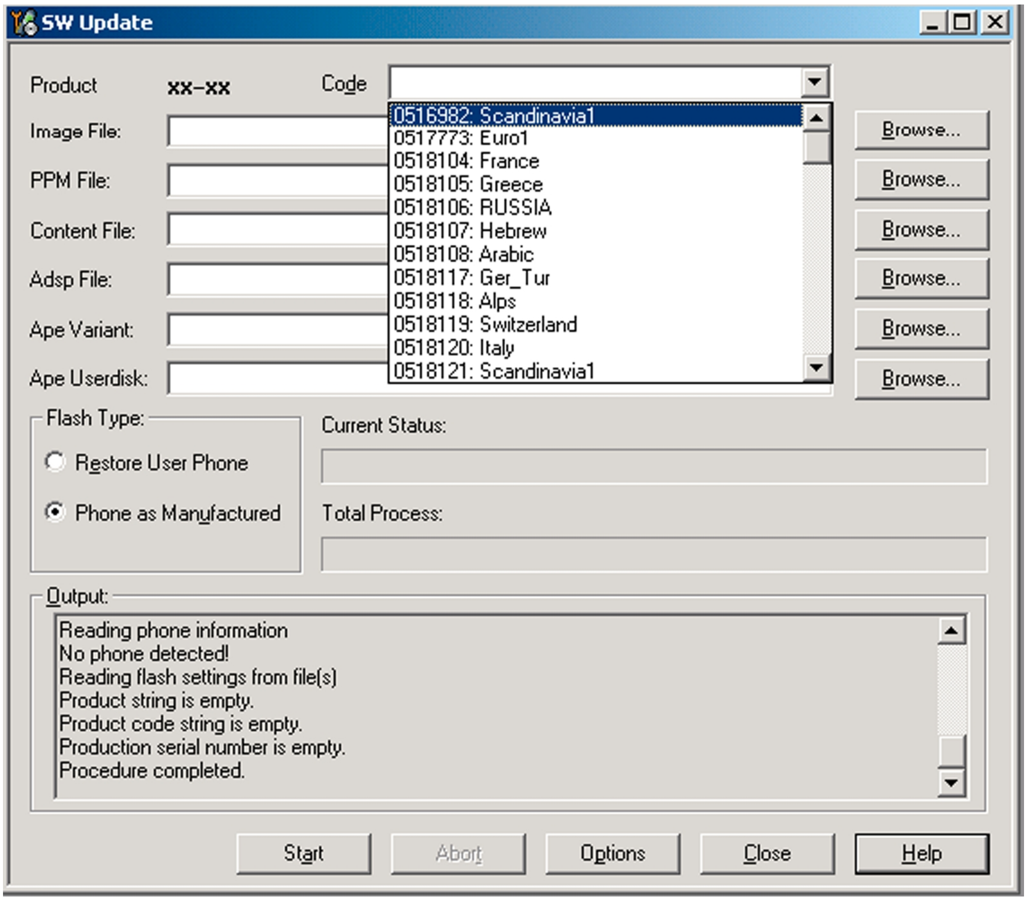
   ii Update the phone MCU software to the latest available version.

   If the new flash is empty and the phone cannot communicate with *Phoenix*, reflash the phone.

iii Choose the product manually from **File→Open Product** , and click **OK**.

Wait for the phone type designator (e.g. “RM-1”) to be displayed in the status bar.

iv Go to **Flashing→SW Update** and wait until *Phoenix* reads the product data as shown in the following picture.



SW Update
Code
0516982: Scandinavia1
0517773: Euro1
0518104: France
0518105: Greece
0518106: RUSSIA
0518107: Hebrew
0518108: Arabic
0518117: Ger_Tur
0518118: Alps
0518119: Switzerland
0518120: Italy
0518121: Scandinavia1
Image File:
PPM File:
Content File:
Adsp File:
Ape Variant:
Ape Userdisk:
Browse...
Current Status:
Total Process:
Output:
Start
Abort
Options
Close
Help

Product xx-xx

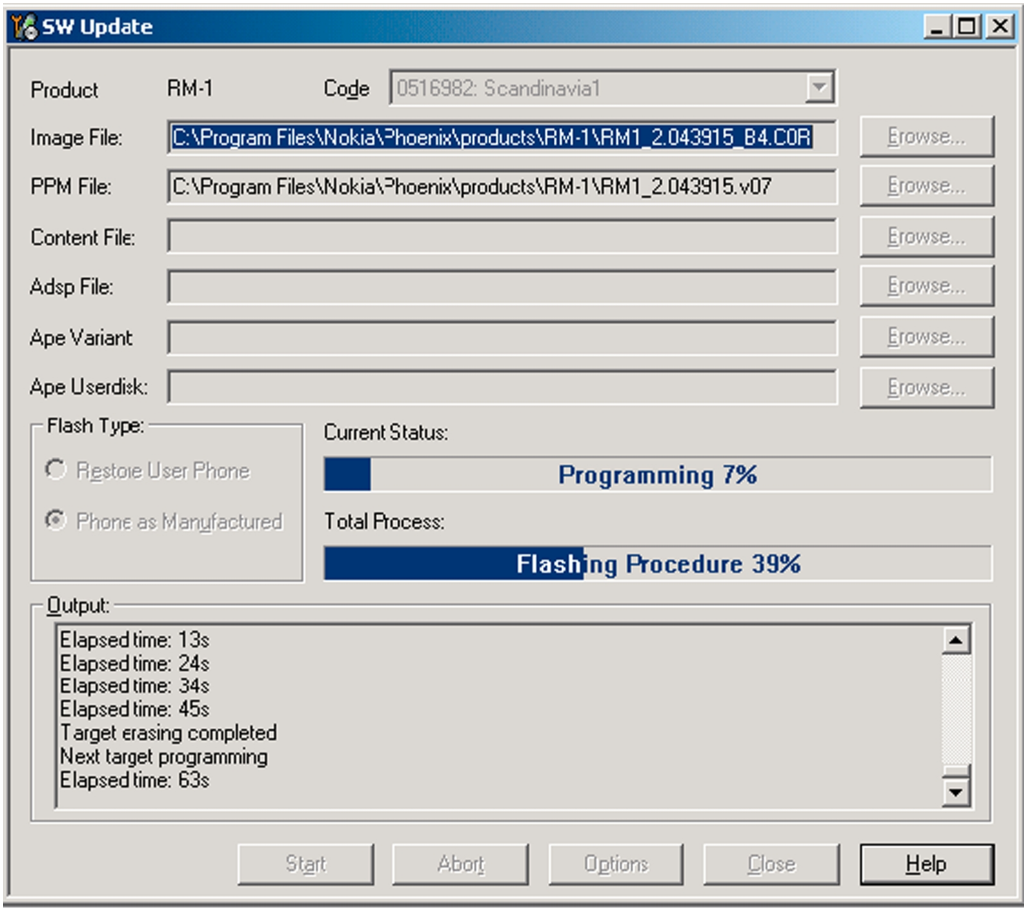
Flash Type:
○ Restore User Phone
● Phone as Manufactured

```
Reading phone information
No phone detected!
Reading flash settings from file(s)
Product string is empty.
Product code string is empty.
Production serial number is empty.
Procedure completed.
```

Product	is automatically set according to the phone support module which was opened manually, but the flash files cannot be found because the correct data cannot be read from the phone automatically.
Code	must be chosen manually, it determines the correct flash files to be used. Please choose the correct product code (can be seen in the phone type label) from the dropdown list.
Flash Type	must be set to **Phone as Manufactured**.

v To continue, click **Start**.

Progress bars and messages on the screen show actions during phone programming, please wait.


SW Update
Browse...
Browse...
Browse...
Browse...
Browse...
Browse...
Start
Abort
Options
Close
Help

Product: RM-1

Code: 0516982: Scandinavia1

Image File: C:\Program Files\Nokia\Phoenix\products\RM-1\RM1_2.043915_B4.C0R

PPM File: C:\Program Files\Nokia\Phoenix\products\RM-1\RM1_2.043915.v07

Content File:

Adsp File:

Ape Variant

Ape Userdisk:

Flash Type:
○ Restore User Phone
● Phone as Manufactured

Current Status: Programming 7%

Total Process: Flashing Procedure 39%

Output:

```
Elapsed time: 13s
Elapsed time: 24s
Elapsed time: 34s
Elapsed time: 45s
Target erasing completed
Next target programming
Elapsed time: 63s
```

Programming is completed when *Flashing Completed* message is displayed.

The product type designator and MCU SW version are displayed in the status bar.

vi Close the *SW Update* window and then choose **File→Close Product** .

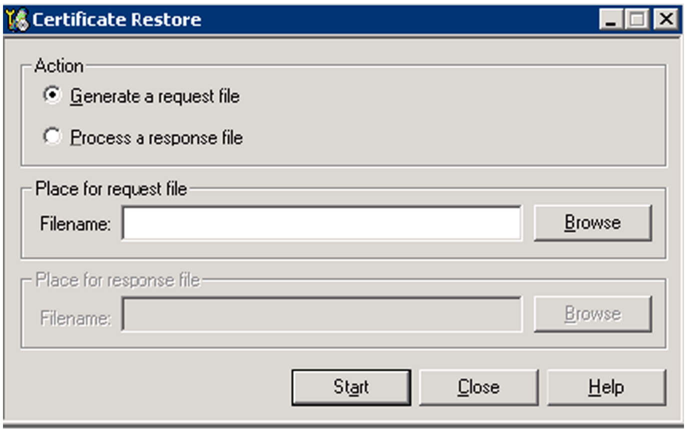
2. Create a *Request* file.

For this procedure, you must supply +12 V to CU-4 from an external power supply.

i To connect the phone with *Phoenix*, choose **File→Scan Product** .

ii Choose **Tools→Certificate Restore** .

iii To choose a location for the request file, click **Browse**.

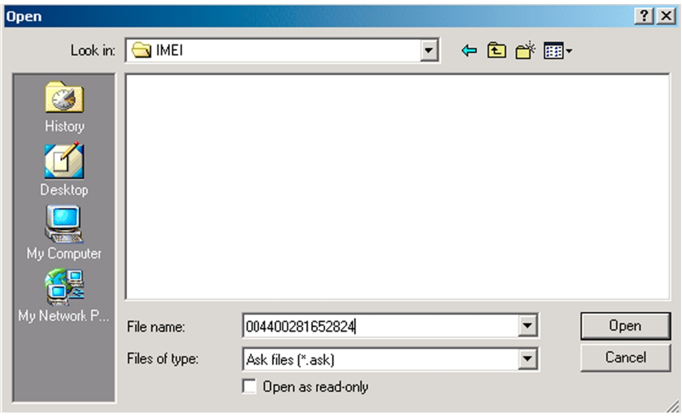

Certificate Restore
Browse
Browse
Start
Close
Help

Action
● Generate a request file
○ Process a response file

Place for request file
Filename:

Place for response file
Filename:

iv Name the file so that you can easily identify it, and click **Open**.


Open
History
Desktop
My Computer
My Network P...
Open
Cancel

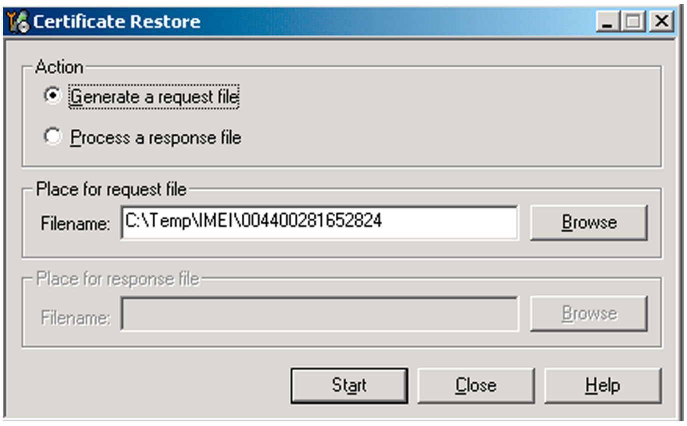
Look in: IMEI

File name: 004400281652824

Files of type: Ask files (*.ask)

☐ Open as read-only

The name of the file and its location are shown.


Certificate Restore
Browse
Browse
Start
Close
Help

Action

● Generate a request file

○ Process a response file

Place for request file

Filename: C:\Temp\IMEI\004400281652824

Place for response file

Filename:

v To create the *Request* file, click **Start**.

vi When the file for certificate restore has been created, send it to Nokia as an e-mail attachment.

3. Restore certificate.

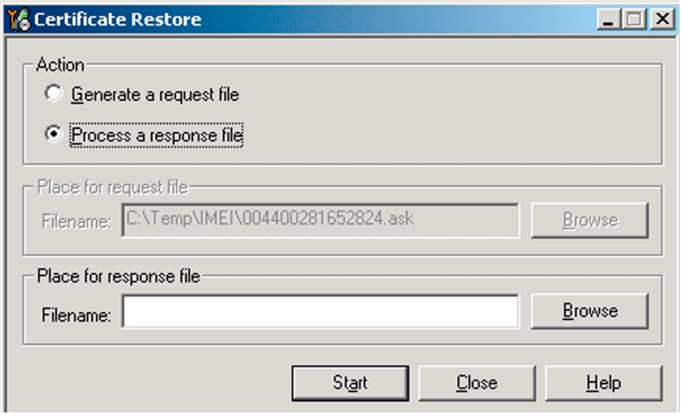
For this procedure, you must supply +12 V to CU-4 from an external power supply.

i Save the reply file sent by Nokia to your computer.

ii Start *Phoenix* service software.

iii Choose **File→Scan Product** .

iv From the **Tools** menu, choose **Certificate Restore** and select **Process a response file** in the *Action* pane.



Certificate Restore

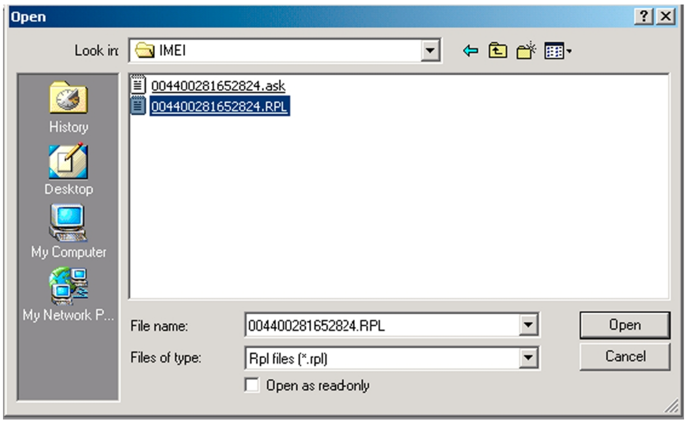
Action
○ Generate a request file
● Process a response file

Place for request file
Filename: C:\Temp\IMEI\004400281652824.ask

Place for response file
Filename:

v To choose the location where response file is saved, click **Browse**.

vi Click **Open**.



Open

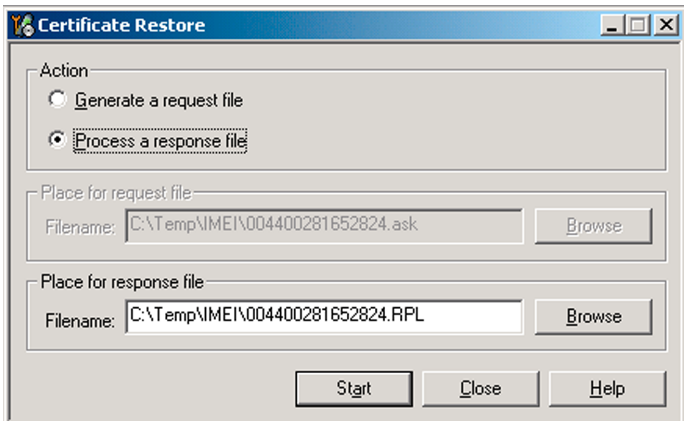
Look in: IMEI

004400281652824.ask
004400281652824.RPL

File name: 004400281652824.RPL
Files of type: Rpl files (*.rpl)
☐ Open as read-only

The name of the file and the path where it is located are shown.

vii To write the file to phone, click **Start**.



Certificate Restore

Action
○ Generate a request file
● Process a response file

Place for request file
Filename: C:\Temp\IMEI\004400281652824.ask

Place for response file
Filename: C:\Temp\IMEI\004400281652824.RPL

Next action

After a successful rewrite, you must retune the phone completely by using *Phoenix* tuning functions.

Important: Perform all tunings: RF, BB, and UI.

Display module troubleshooting

General instructions for display troubleshooting

Context

- The display is in a normal mode when the phone is in active use.
- Display is in a partial idle mode when the phone is in the screen saver mode.
- The operating modes of the display can be controlled with the help of *Phoenix*.

Table 2 Display module troubleshooting cases

Display blank	There is no image on the display. The display looks the same when the phone is on as it does when the phone is off. The backlight can be on in some cases.
Image on the display not correct	Image on the display can be corrupted or a part of the image can be missing. If a part of the image is missing, change the display module. If the image is otherwise corrupted, follow the appropriate troubleshooting diagram.
Backlight dim or not working at all	Backlight LED components are inside the display module. Backlight failure can also be in the connector or in the backlight power source in the main engine of the phone. This means that in case the display is working (image OK), the backlight is faulty.
Visual defects (pixel)	Pixel defects can be checked by controlling the display with Phoenix. Use both colours, black and white, on a full screen. The display may have some random pixel defects that are acceptable for this type of display. The criteria when pixel defects are regarded as a display failure, resulting in a replacement of the display, are presented the following table.

Table 3 Pixel defects

Item		White dot defect				Black dot defect	Total
1	Defect counts	R	G	B	White Dot Total	1	1
		1	1	1	1		
2	Combined defect counts	Not allowed. Two single dot defects that are within 5 mm of each other should be interpreted as combined dot defect.					

Steps

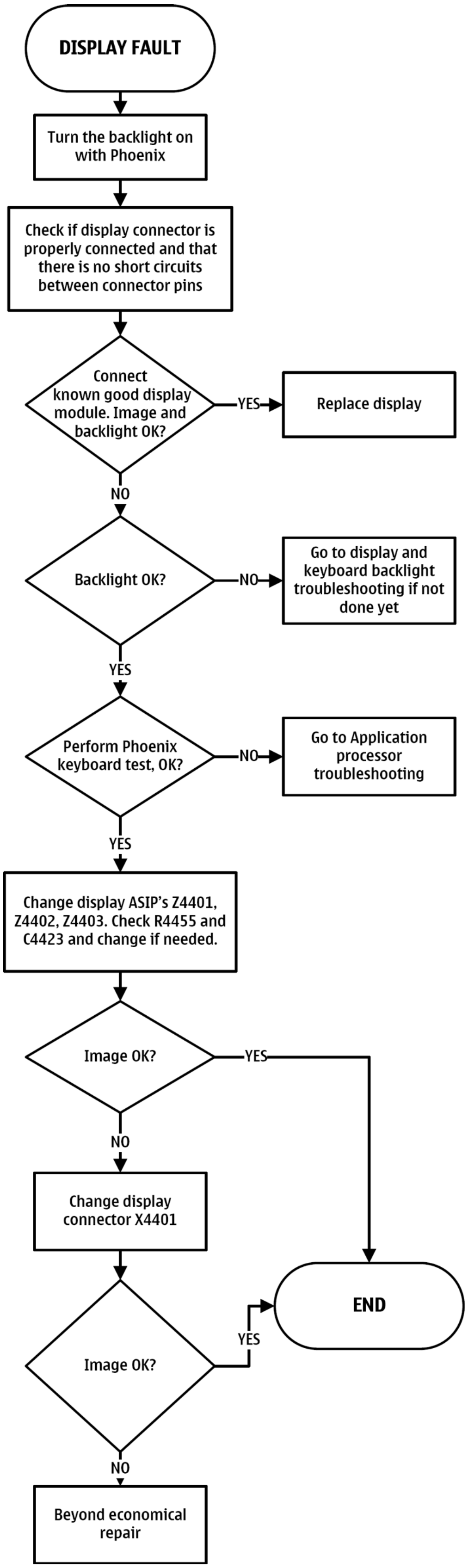
1. Verify with a working display that the fault is not on the display module itself.

   The display module cannot be repaired.
2. Check that the cellular engine is working normally.
   - i To check the functionality, connect the phone to a docking station.
   - ii Start *Phoenix* service software.
   - iii Read the phone information to check that also the application engine is functioning normally (you should be able to read the APE ID).
3. Proceed to the display troubleshooting flowcharts.

   Use the **Display Test** tool in *Phoenix* to find the detailed fault mode.

Display fault troubleshooting

Troubleshooting flow


DISPLAY FAULT
Turn the backlight on with Phoenix
Check if display connector is properly connected and that there is no short circuits between connector pins
Connect known good display module. Image and backlight OK?
YES
Replace display
NO
Backlight OK?
NO
Go to display and keyboard backlight troubleshooting if not done yet
YES
Perform Phoenix keyboard test, OK?
NO
Go to Application processor troubleshooting
YES
Change display ASIP's Z4401, Z4402, Z4403. Check R4455 and C4423 and change if needed.
Image OK?
YES
NO
Change display connector X4401
END
YES
Image OK?
NO
Beyond economical repair

Display and keyboard backlight troubleshooting

Context

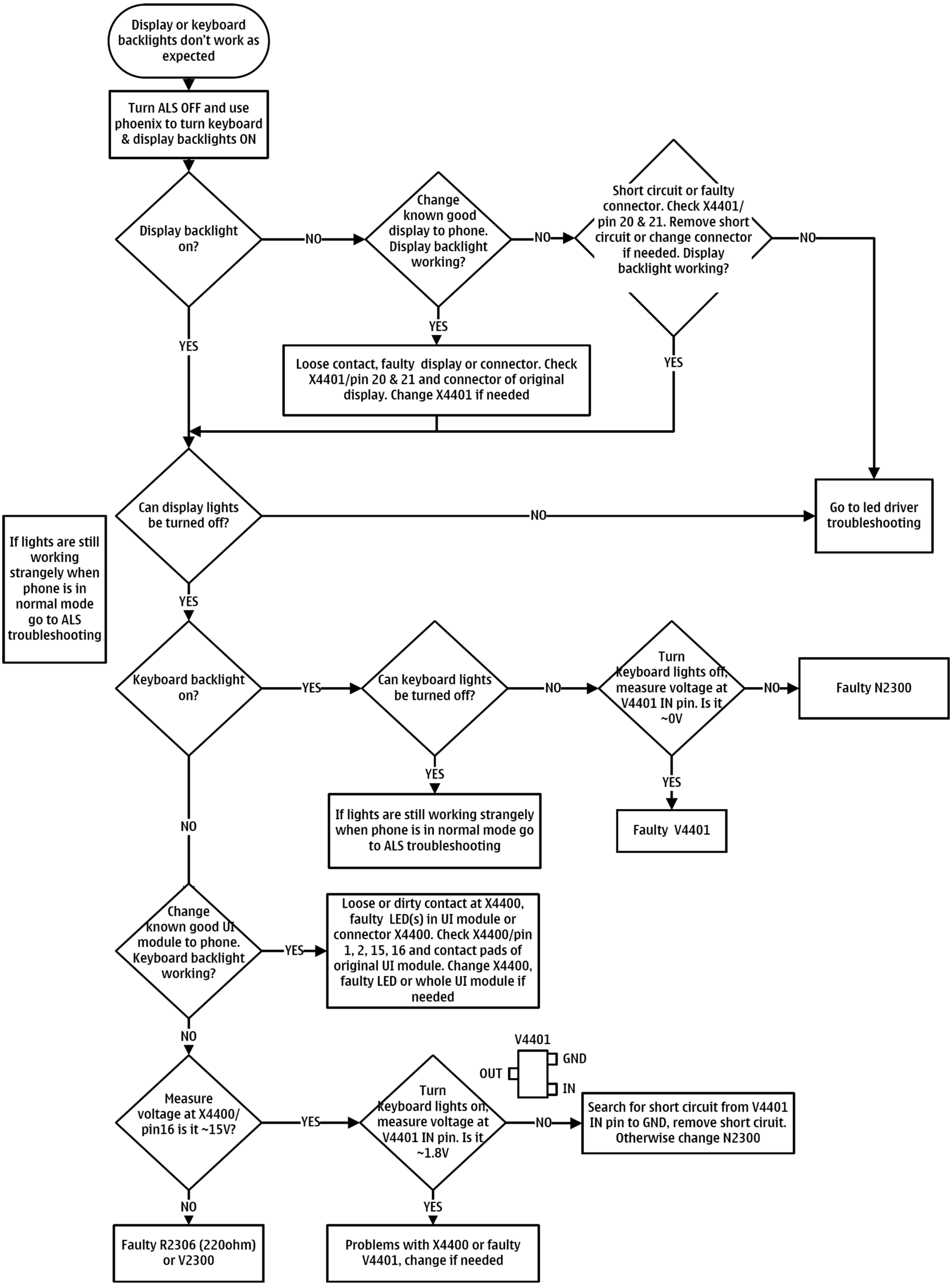
The device has one LED driver that provides current for both display and keyboard backlights.

Keyboard backlights are turned ON only in dark conditions. This is controlled by the Ambient Light Sensor (ALS). Also the brightness of the display is adjusted by the ambient light sensor.

You can enable/disable ALS with the help of Phoenix service software.

Display brightness can be adjusted manually, if ALS is disabled. If the ambient light sensor is enabled, it adjusts the display brightness automatically.

Troubleshooting flow


Display or keyboard backlights don't work as expected
Turn ALS OFF and use phoenix to turn keyboard & display backlights ON
Display backlight on?
NO
Change known good display to phone. Display backlight working?
NO
Short circuit or faulty connector. Check X4401/ pin 20 & 21. Remove short circuit or change connector if needed. Display backlight working?
NO
YES
YES
Loose contact, faulty display or connector. Check X4401/pin 20 & 21 and connector of original display. Change X4401 if needed
YES
Can display lights be turned off?
NO
Go to led driver troubleshooting
If lights are still working strangely when phone is in normal mode go to ALS troubleshooting
YES
Keyboard backlight on?
YES
Can keyboard lights be turned off?
NO
Turn Keyboard lights off, measure voltage at V4401 IN pin. Is it ~0V
NO
Faulty N2300
YES
If lights are still working strangely when phone is in normal mode go to ALS troubleshooting
YES
Faulty V4401
NO
Change known good UI module to phone. Keyboard backlight working?
YES
Loose or dirty contact at X4400, faulty LED(s) in UI module or connector X4400. Check X4400/pin 1, 2, 15, 16 and contact pads of original UI module. Change X4400, faulty LED or whole UI module if needed
NO
V4401
GND
OUT
IN
Measure voltage at X4400/ pin16 is it ~15V?
YES
Turn Keyboard lights on, measure voltage at V4401 IN pin. Is it ~1.8V
NO
Search for short circuit from V4401 IN pin to GND, remove short ciruit. Otherwise change N2300
NO
YES
Faulty R2306 (220ohm) or V2300
Problems with X4400 or faulty V4401, change if needed

ALS troubleshooting

Context

- If a phototransistor is broken, replace it with a typical phototransistor.
- The phototransistor has to be also replaced, if calibration values are lost by some other reason.
- If the phototransistor is changed, the calibration value in the phone memory has to be changed to the default value ‘1’.
- Make sure that you have completed **Display and keypad backlight troubleshooting** first before starting **ALS troubleshooting**.

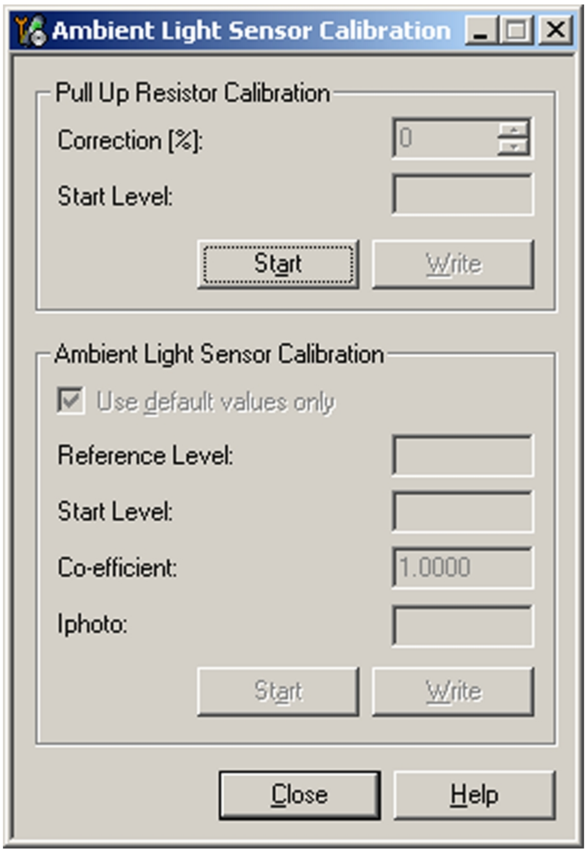
Here are some hints for ALS troubleshooting; the following troubleshooting diagram refers to these:

- *Phoenix* LED control tool also shows you luminance. The correct luminance in darkness is <20 lx, and in office environment 100-2000 lx. The luminance value depends strongly on the light source and the angle of the phone, so these values are only a rough guideline.
- LED driver control voltage measurement points can be found from the **LED driver troubleshooting** section. When backlight brightness is set to 100%, both GENOUT signals are low, and enable PWM is 100%.
- *Phoenix* has an ambient light sensor calibration tool for changing calibration values. The pull-up resistor calibration is done first. See the following procedure.

Steps

1. Cover the light guide (upper part of the A Cover).
2. Start *Phoenix*.
3. Choose **File→Scan Product.**

4. Choose **Tuning→Ambient Light Sensor Calibration.**



Ambient Light Sensor Calibration

Pull Up Resistor Calibration

Correction [%]: 0

Start Level:

Ambient Light Sensor Calibration

☑ Use default values only

Reference Level:

Start Level:

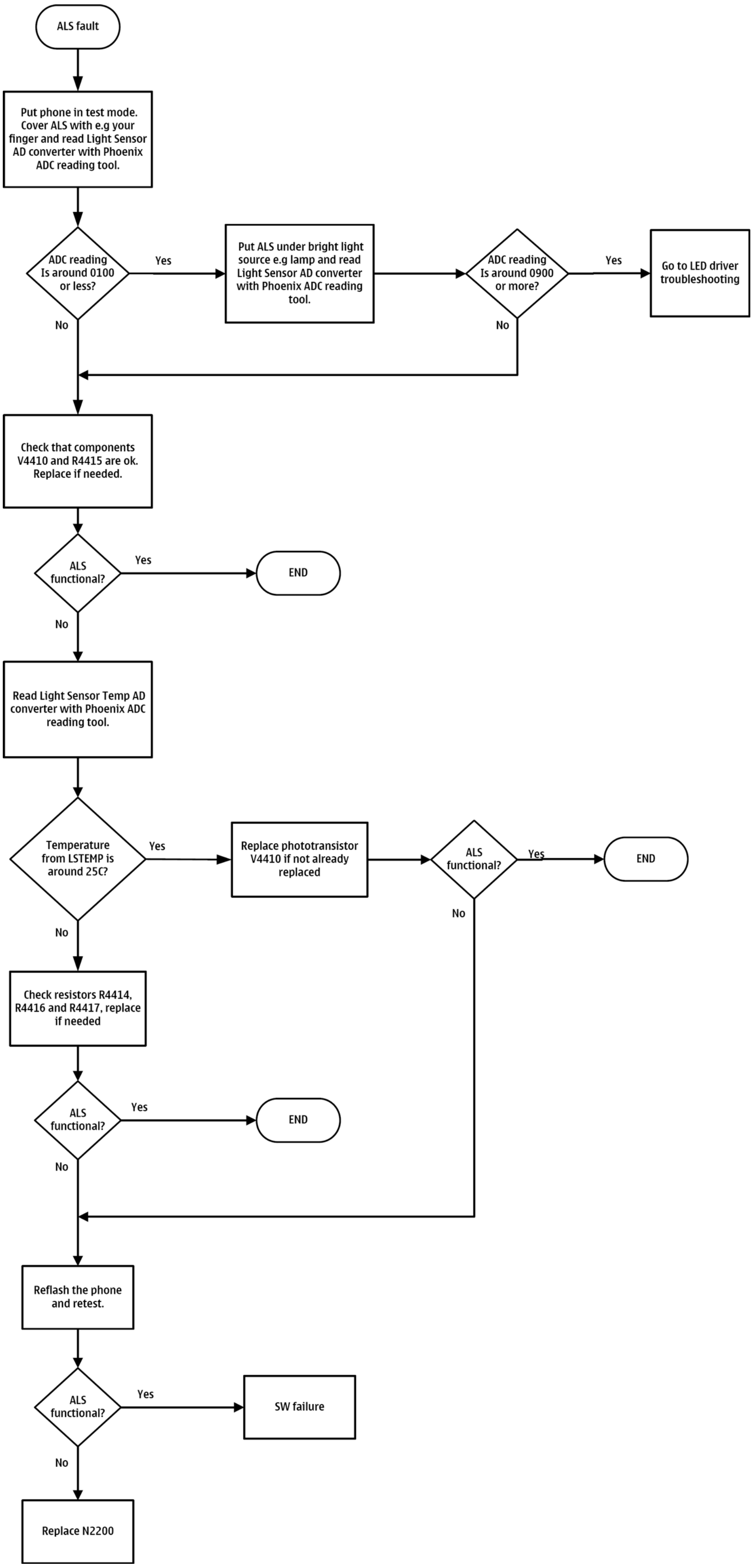
Co-efficient: 1.0000

Iphoto:

Figure 50 ***Ambient Light Sensor Calibration*** **window**

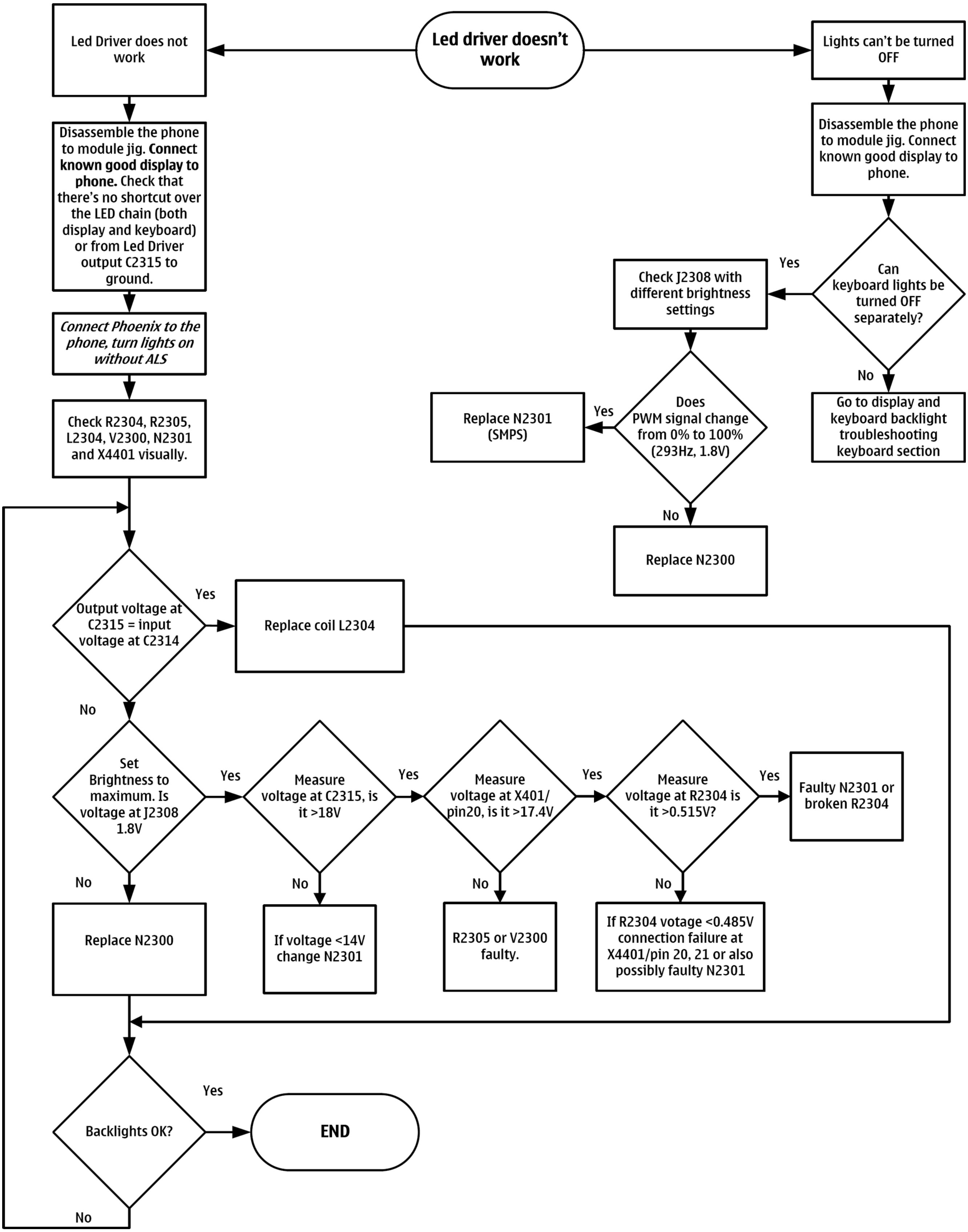
5. In the *Pull Up Resistor Calibration* pane, click **Start**, and **Write**.
6. In the *Ambient Light Sensor Calibration* pane, check the **Use default values only** check box, and click **Write**.
7. To end the calibration, click **Close**.

Troubleshooting flow


ALS fault
Put phone in test mode. Cover ALS with e.g your finger and read Light Sensor AD converter with Phoenix ADC reading tool.
ADC reading Is around 0100 or less?
Yes
No
Put ALS under bright light source e.g lamp and read Light Sensor AD converter with Phoenix ADC reading tool.
ADC reading Is around 0900 or more?
Yes
No
Go to LED driver troubleshooting
Check that components V4410 and R4415 are ok. Replace if needed.
ALS functional?
Yes
END
No
Read Light Sensor Temp AD converter with Phoenix ADC reading tool.
Temperature from LSTEMP is around 25C?
Yes
Replace phototransistor V4410 if not already replaced
ALS functional?
Yes
END
No
No
Check resistors R4414, R4416 and R4417, replace if needed
ALS functional?
Yes
END
No
Reflash the phone and retest.
ALS functional?
Yes
SW failure
No
Replace N2200

LED driver troubleshooting

Troubleshooting flow


Led driver doesn't work
Led Driver does not work
Disassemble the phone to module jig. **Connect known good display to phone.** Check that there's no shortcut over the LED chain (both display and keyboard) or from Led Driver output C2315 to ground.
Connect Phoenix to the phone, turn lights on without ALS
Check R2304, R2305, L2304, V2300, N2301 and X4401 visually.
Output voltage at C2315 = input voltage at C2314
Yes
Replace coil L2304
No
Set Brightness to maximum. Is voltage at J2308 1.8V
Yes
Measure voltage at C2315, is it >18V
Yes
Measure voltage at X401/ pin20, is it >17.4V
Yes
Measure voltage at R2304 is it >0.515V?
Yes
Faulty N2301 or broken R2304
No
Replace N2300
No
If voltage <14V change N2301
No
R2305 or V2300 faulty.
No
If R2304 votage <0.485V connection failure at X4401/pin 20, 21 or also possibly faulty N2301
Backlights OK?
Yes
END
No
Lights can't be turned OFF
Disassemble the phone to module jig. Connect known good display to phone.
Can keyboard lights be turned OFF separately?
Yes
Check J2308 with different brightness settings
No
Go to display and keyboard backlight troubleshooting keyboard section
Does PWM signal change from 0% to 100% (293Hz, 1.8V)
Yes
Replace N2301 (SMPS)
No
Replace N2300

Bluetooth troubleshooting

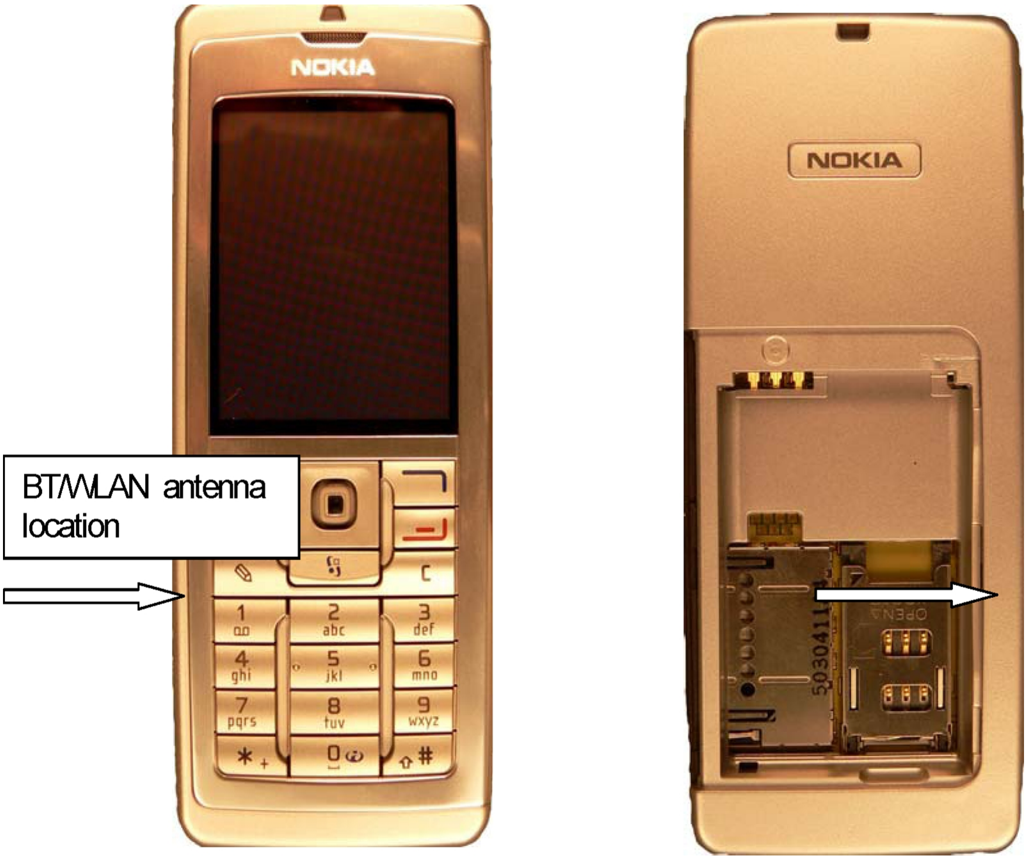
Introduction to Bluetooth troubleshooting

There are two main Bluetooth problems that can occur:

Problem	Description
Detachment of the BT antenna.	This would most likely happen if the device has been dropped repeatedly to the ground. It could cause the BT antenna to become loose or partially detached from the PWB. (see next page for details about BT antenna HW and Mechanics)
A malfunction in the BT ASIC, BB ASICs or Phone’s BT SMD components.	This is unpredictable and could have many causes i.e. SW or HW related.

The main issue is to find out if the problem is related to the BT antenna or related to the BT system or the phone’s BB and then replace/fix the faulty component.

Location of the BT/WLAN antenna



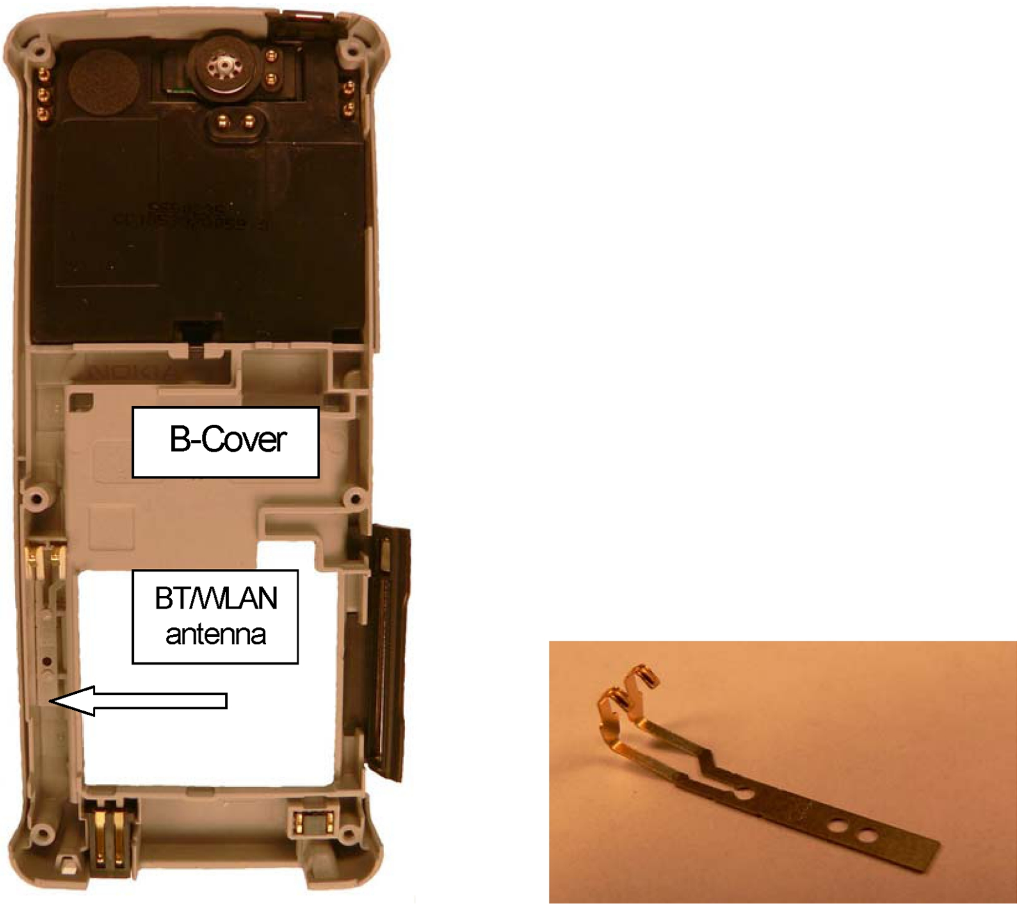
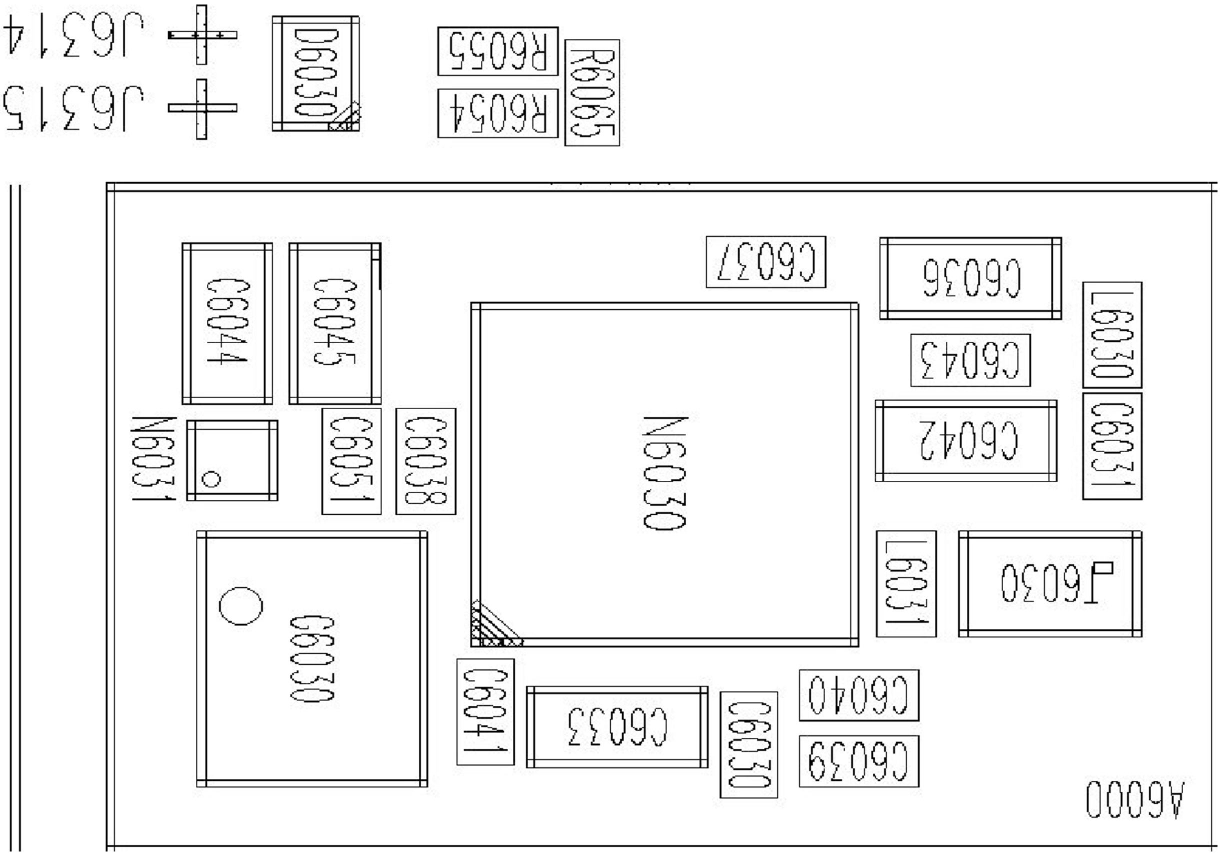

B-Cover
BT/WLAN antenna

Figure 51 Antenna element

BT component layout


J6314
J6315
D6030
R6055
R6054
R6065
C6044
C6045
C6037
C6036
L6030
C6043
C6042
C6031
N6031
C6051
C6038
N6030
G6030
L6031
J6030
C6041
C6033
C6030
C6040
C6039
A6000

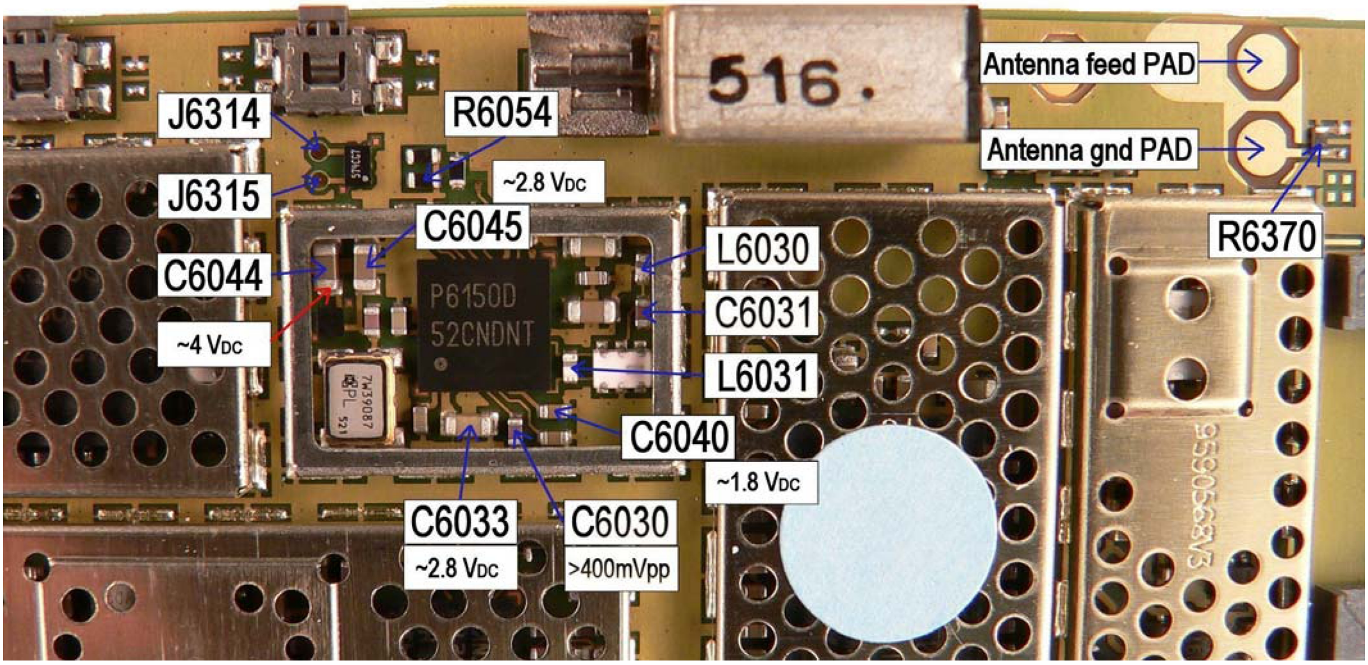

516.
Antenna feed PAD
Antenna gnd PAD
R6370
J6314
R6054
~2.8 VDC
J6315
C6045
C6044
~4 VDC
P6150D
52CNDNT
L6030
C6031
L6031
C6040
~1.8 VDC
C6033
~2.8 VDC
C6030
>400mVpp

Figure 52 BT component assembly and placing

Bluetooth settings for Phoenix

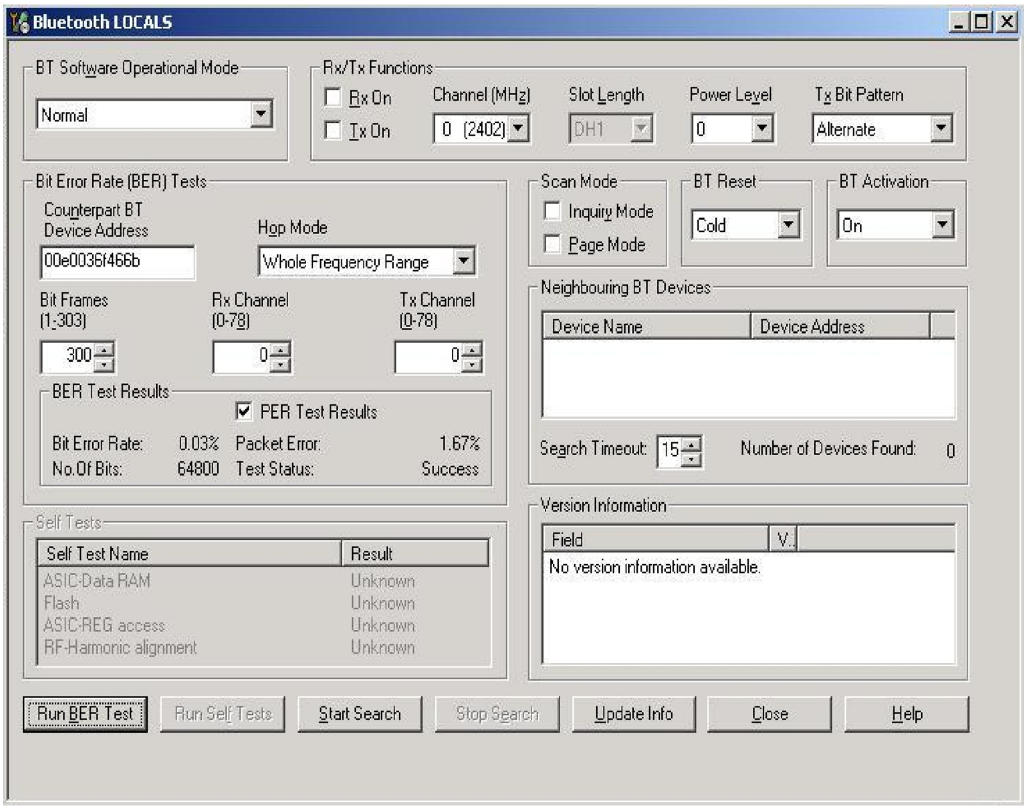
Steps

1. Start *Phoenix* service software.
2. From the **File** menu, choose **Open Product**, and then choose the correct type designator from the **Product** list.
3. Connect the phone to a docking station in the local mode.
4. From the **Testing** menu, choose **Testing→Bluetooth LOCALS** .
5. Locate JBT-3's or SB-6's serial number (12 digits) found in the type label on the back of BT-box.
6. In the *Bluetooth LOCALS* window, write the 12-digit serial number on the **Counterpart BT Device Address** line.

   This needs to be done only once provided that JBT-3 or SB-6 is not changed.
7. Place the BT box near (within 10 – 15 cm) to the BT antenna.
8. To run the tests, click **Run BER Test**.

Results

When the BER Test Results is below 0.1% (depending on distance) the test is passed.


Bluetooth LOCALS
Rx/Tx Functions
Bit Error Rate (BER) Tests
Neighbouring BT Devices
Version Information
Self Tests
Run BER Test
Run Self Tests
Start Search
Stop Search
Update Info
Close
Help

BT Software Operational Mode: Normal

☐ Rx On
☐ Tx On

Channel (MHz): 0 (2402)
Slot Length: DH1
Power Level: 0
Tx Bit Pattern: Alternate

Scan Mode: ☐ Inquiry Mode ☐ Page Mode
BT Reset: Cold
BT Activation: On

Counterpart BT Device Address: 00e0036f466b
Hop Mode: Whole Frequency Range
Bit Frames (1-303): 300
Rx Channel (0-78): 0
Tx Channel (0-78): 0

BER Test Results ☑ PER Test Results

Bit Error Rate: 0.03% Packet Error: 1.67%
No.Of Bits: 64800 Test Status: Success

Device Name	Device Address

Search Timeout: 15
Number of Devices Found: 0

Self Test Name	Result
ASIC-Data RAM	Unknown
Flash	Unknown
ASIC-REG access	Unknown
RF-Harmonic alignment	Unknown

Field	V.
No version information available.	

Figure 53 BER test result

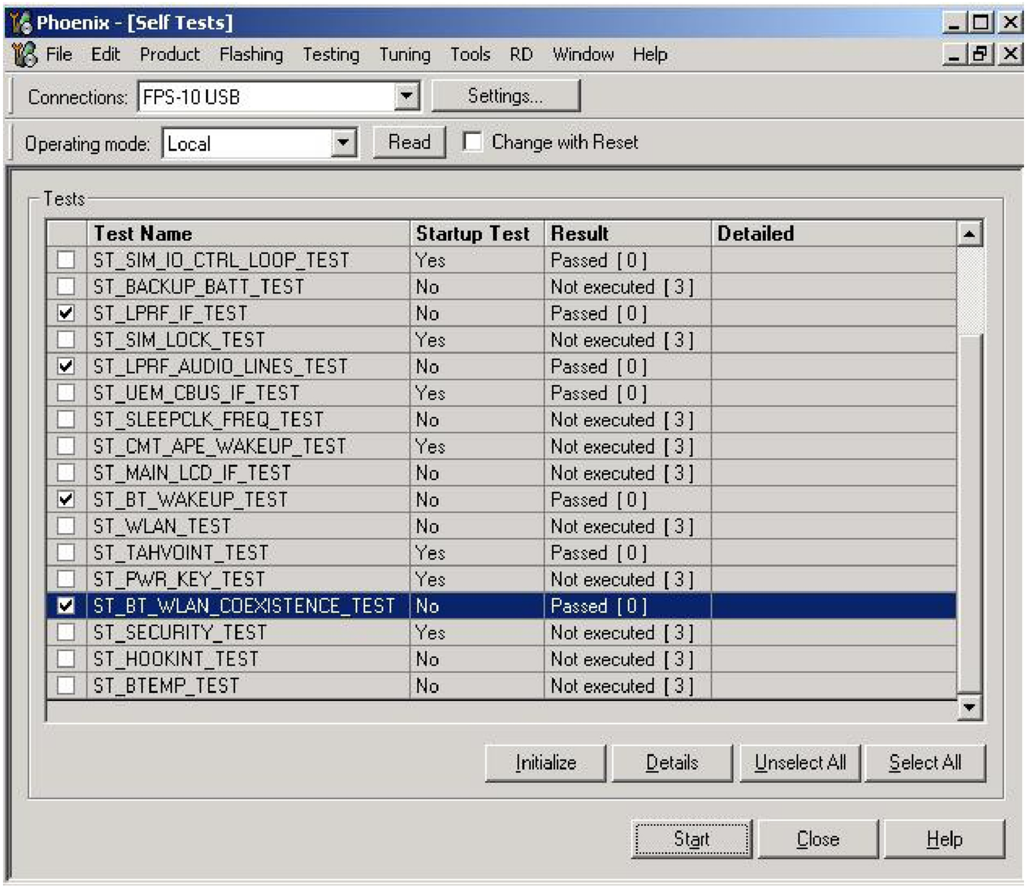
Bluetooth self tests in Phoenix

Steps

1. Start *Phoenix* service software.
2. Choose**File→Open Product.** Then choose the correct type designator from the product list.

3. Connect the phone to a docking station in the local mode.
4. Choose **Testing→Self Tests.**
5. In the *Self Tests* window check the following Bluetooth related tests:
    - **ST_LPRF_IF_TEST**
    - **ST_LPRF_AUDIO_LINES_TEST**
    - **ST_BT_WAKEUP_TEST**
    - **ST_BT _WLAN_COEXISTENCE_TEST**
6. To run the tests, click **Start**.

    When the results are passed then BT Self Test is accepted.


Phoenix - [Self Tests]
File
Edit
Product
Flashing
Testing
Tuning
Tools
RD
Window
Help
Settings...
Read
Tests
Initialize
Details
Unselect All
Select All
Start
Close
Help

Connections: FPS-10 USB

Operating mode: Local

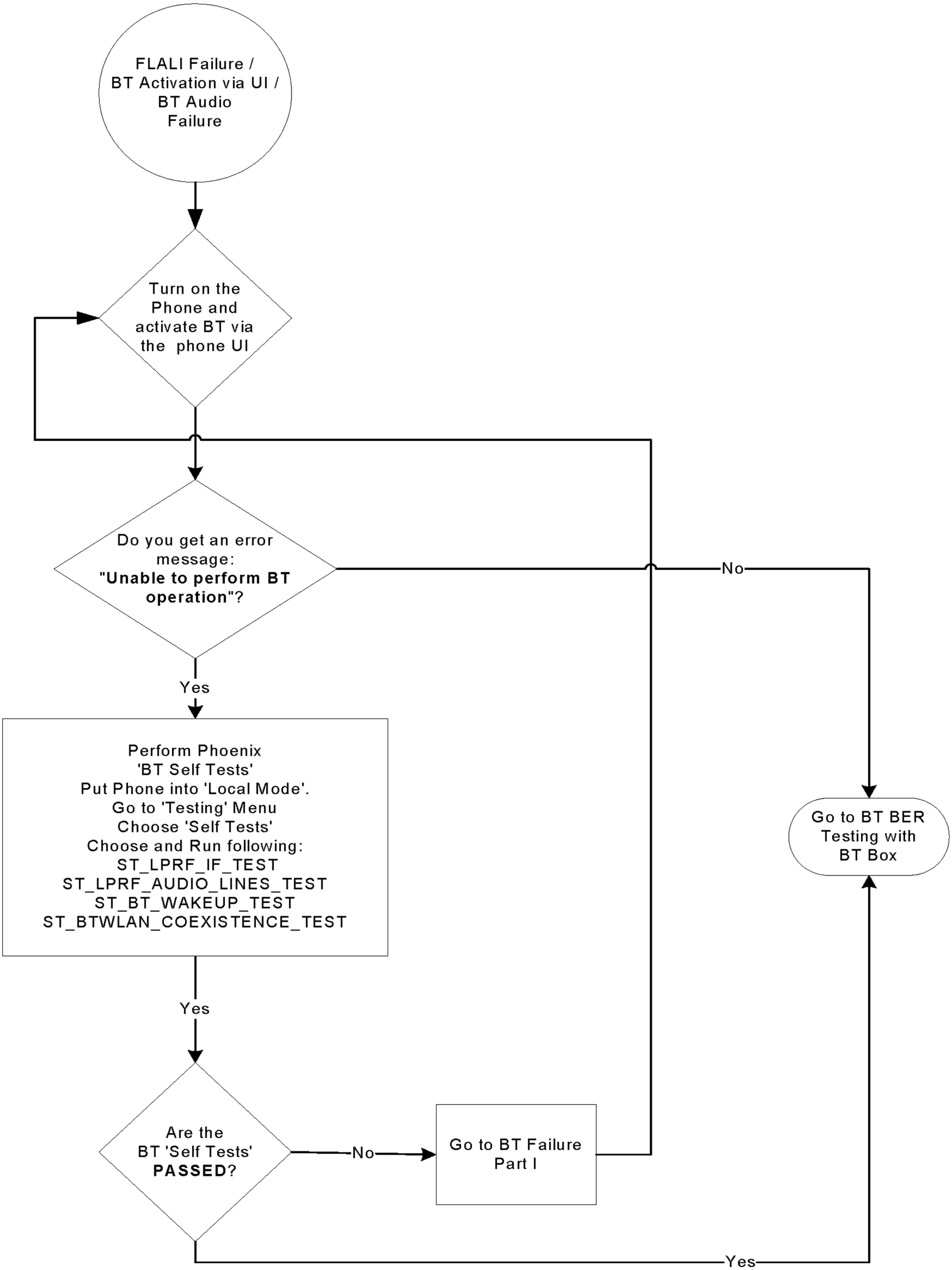
☐ Change with Reset

	Test Name	Startup Test	Result	Detailed
☐	ST_SIM_IO_CTRL_LOOP_TEST	Yes	Passed [0]	
☐	ST_BACKUP_BATT_TEST	No	Not executed [3]	
☑	ST_LPRF_IF_TEST	No	Passed [0]	
☐	ST_SIM_LOCK_TEST	Yes	Not executed [3]	
☑	ST_LPRF_AUDIO_LINES_TEST	No	Passed [0]	
☐	ST_UEM_CBUS_IF_TEST	Yes	Passed [0]	
☐	ST_SLEEPCLK_FREQ_TEST	No	Not executed [3]	
☐	ST_CMT_APE_WAKEUP_TEST	Yes	Not executed [3]	
☐	ST_MAIN_LCD_IF_TEST	No	Not executed [3]	
☑	ST_BT_WAKEUP_TEST	No	Passed [0]	
☐	ST_WLAN_TEST	No	Not executed [3]	
☐	ST_TAHVOINT_TEST	Yes	Passed [0]	
☐	ST_PWR_KEY_TEST	Yes	Not executed [3]	
☑	ST_BT_WLAN_COEXISTENCE_TEST	No	Passed [0]	
☐	ST_SECURITY_TEST	Yes	Not executed [3]	
☐	ST_HOOKINT_TEST	No	Not executed [3]	
☐	ST_BTEMP_TEST	No	Not executed [3]	

Figure 54 Bluetooth self tests in *Phoenix*

FLALI/BT audio failure troubleshooting

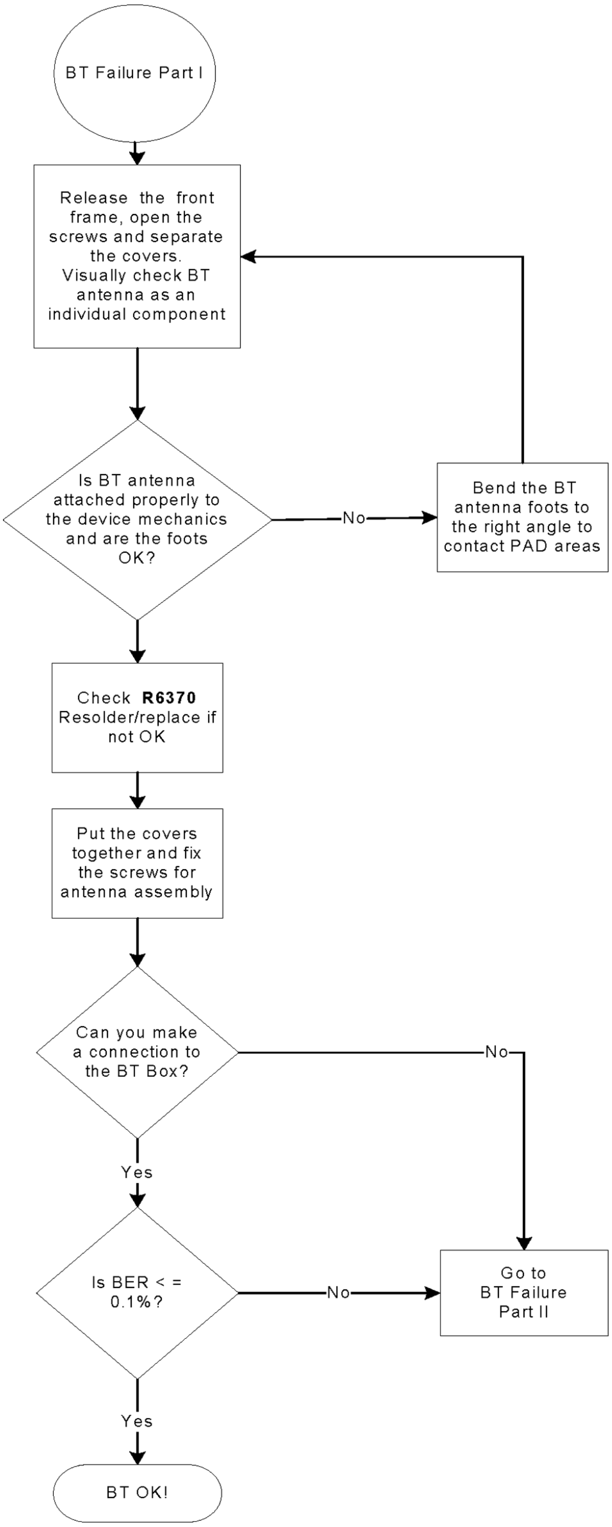
Troubleshooting flow

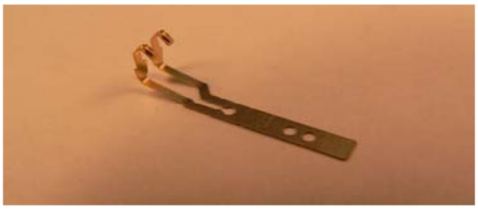

FLALI Failure / BT Activation via UI / BT Audio Failure
Turn on the Phone and activate BT via the phone UI
Do you get an error message: "Unable to perform BT operation"?
No
Yes
Perform Phoenix 'BT Self Tests'
Put Phone into 'Local Mode'.
Go to 'Testing' Menu
Choose 'Self Tests'
Choose and Run following:
ST_LPRF_IF_TEST
ST_LPRF_AUDIO_LINES_TEST
ST_BT_WAKEUP_TEST
ST_BTWLAN_COEXISTENCE_TEST
Yes
Are the BT 'Self Tests' PASSED?
No
Go to BT Failure Part I
Go to BT BER Testing with BT Box
Yes

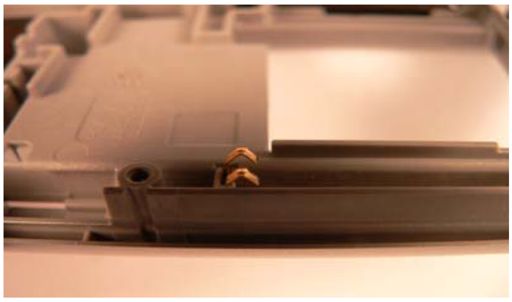
Bluetooth BER failure troubleshooting

Troubleshooting flow

Part I: Check that the BT/WLAN antenna is assembled correctly.

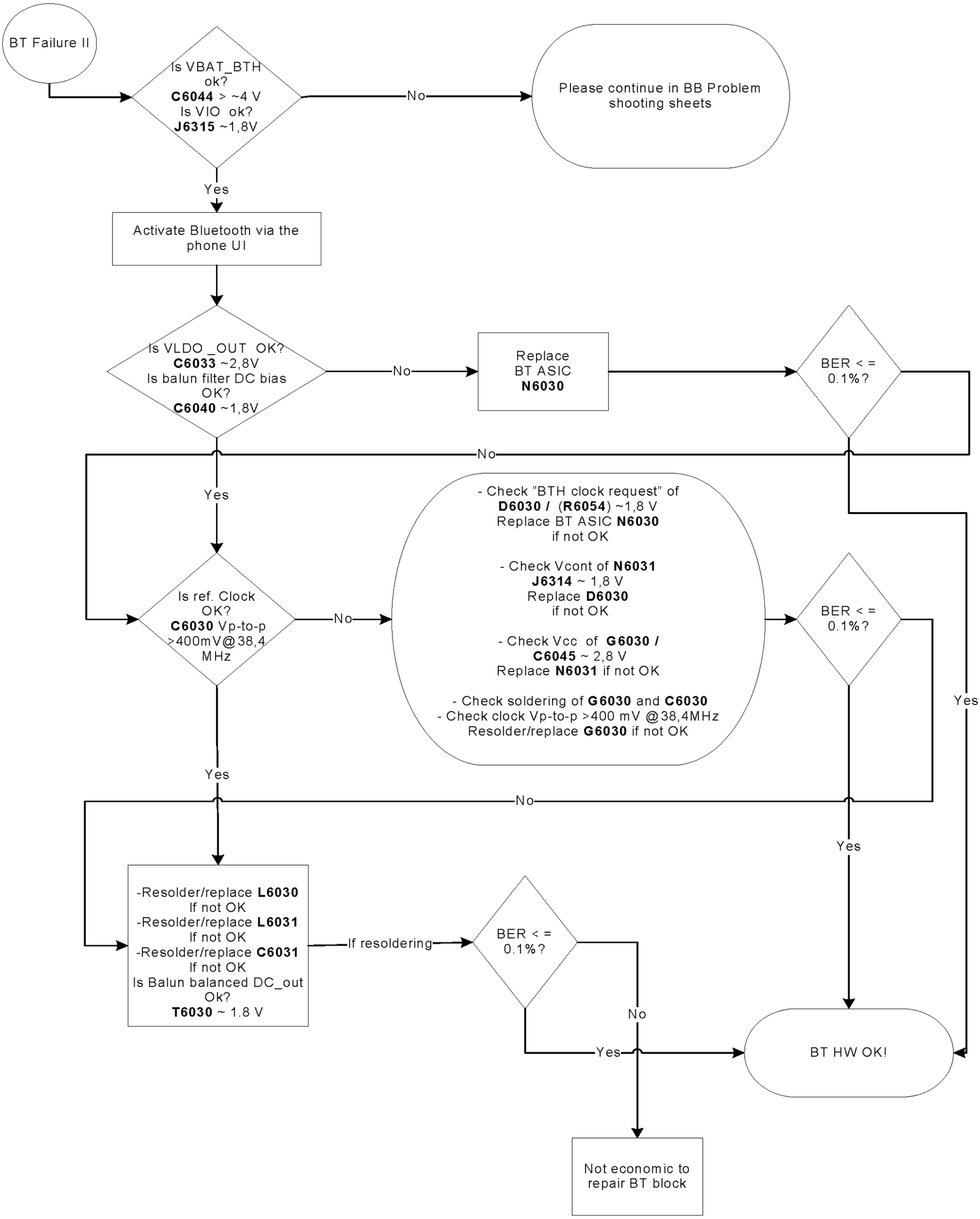

BT Failure Part I
Release the front frame, open the screws and separate the covers. Visually check BT antenna as an individual component
Is BT antenna attached properly to the device mechanics and are the foots OK?
No
Bend the BT antenna foots to the right angle to contact PAD areas
Check R6370 Resolder/replace if not OK
Put the covers together and fix the screws for antenna assembly
Can you make a connection to the BT Box?
No
Yes
Is BER < = 0.1%?
No
Go to BT Failure Part II
Yes
BT OK!





Troubleshooting flow

Part II: Check that BTH components and voltage levels are OK.


BT Failure II
Is VBAT_BTH ok?
C6044 > ~4 V
Is VIO ok?
J6315 ~1,8V
No
Please continue in BB Problem shooting sheets
Yes
Activate Bluetooth via the phone UI
Is VLDO _OUT OK?
C6033 ~2,8V
Is balun filter DC bias OK?
C6040 ~1,8V
No
Replace BT ASIC N6030
BER < = 0.1%?
No
Yes
Is ref. Clock OK?
C6030 Vp-to-p >400mV@38,4 MHz
No
- Check "BTH clock request" of D6030 / (R6054) ~1,8 V
Replace BT ASIC N6030 if not OK
- Check Vcont of N6031
J6314 ~ 1,8 V
Replace D6030 if not OK
- Check Vcc of G6030 / C6045 ~ 2,8 V
Replace N6031 if not OK
- Check soldering of G6030 and C6030
- Check clock Vp-to-p >400 mV @38,4MHz
Resolder/replace G6030 if not OK
BER < = 0.1%?
Yes
Yes
No
Yes
-Resolder/replace L6030
If not OK
-Resolder/replace L6031
If not OK
-Resolder/replace C6031
If not OK
Is Balun balanced DC_out Ok?
T6030 ~ 1.8 V
If resoldering
BER < = 0.1%?
No
Yes
BT HW OK!
Not economic to repair BT block

Audio troubleshooting

Audio troubleshooting test instructions

Differential external earpiece and internal earpiece outputs can be measured either with a single-ended or a differential probe.

When measuring with a single-ended probe each output is measured against the ground.

Internal handsfree output is measured using a current probe, if a special low-pass filter designed for measuring a digital amplifier is not available. Note also that when using a current probe, the input signal frequency must be set to 2kHz.

The input signal for each loop test can be either single-ended or differential.

Required equipment

The following equipment is needed for the tests:

- Oscilloscope
- Function generator (sine waveform)
- 'Active speaker' or 'speaker and power amplifier'
- Sound level meter
- Current probe (Internal handsfree DPMA output measurement)
- Phoenix service software
- Battery voltage 3.7V

Test procedure

Audio can be tested using the Phoenix audio routings option. Three different audio loop paths can be activated:

- External microphone to Internal earpiece
- External microphone to Internal handsfree speaker
- Internal microphone to External earpiece

Each audio loop sets routing from the specified input to the specified output enabling a quick in-out test. Loop path gains are fixed and they cannot be changed using Phoenix. Correct pins and signals for each test are presented in the following table.

Phoenix audio loop tests and test results

The results presented in the table apply when no accessory is connected and battery voltage is set to 3.7V.

Earpiece, internal microphone and speaker are in place during measurement. Applying a headset accessory during measurement causes a significant drop in measured quantities.

The gain values presented in the table apply for a differential output vs. single-ended/differential input.

Loop test	Input terminal	Output terminal	Path gain [dB] (fixed)	Input voltage [mVp-p]	Differential output voltage [mVp-p]	Output DC level [V]	Output current [mA]
External Mic to External Earpiece	XMICP and GND	HSEAR R P, HSEAR R N and GND	-2.9	1000	720	1.2	NA
		HSEAR P, HSEAR N and GND					
	XMICN and GND	HSEAR R P, HSEAR R N and GND					
		HSEAR P, HSEAR N and GND					
External Mic to Internal Earpiece	XMICP and GND	EarP and GND	-4.5	1000	600	1.2	NA
		EarN and GND					
	XMICN and GND	EarP and GND					
		EarN and GND					
External Mic to Internal handsfree	XMICP and GND	B2102 pads	-5	1000	560	0	25mA (calc.)
	XMICN and GND	B2102 pads					
Internal Mic to External Earpiece	B2100 (OUT/GND)	HSEAR R P, HSEAR R N and GND	22.7	100	1360	1.2	NA
		HSEAR P, HSEAR N and GND					
		HSEAR R P, HSEAR R N and GND					
		HSEAR P, HSEAR N and GND					

Measurement data

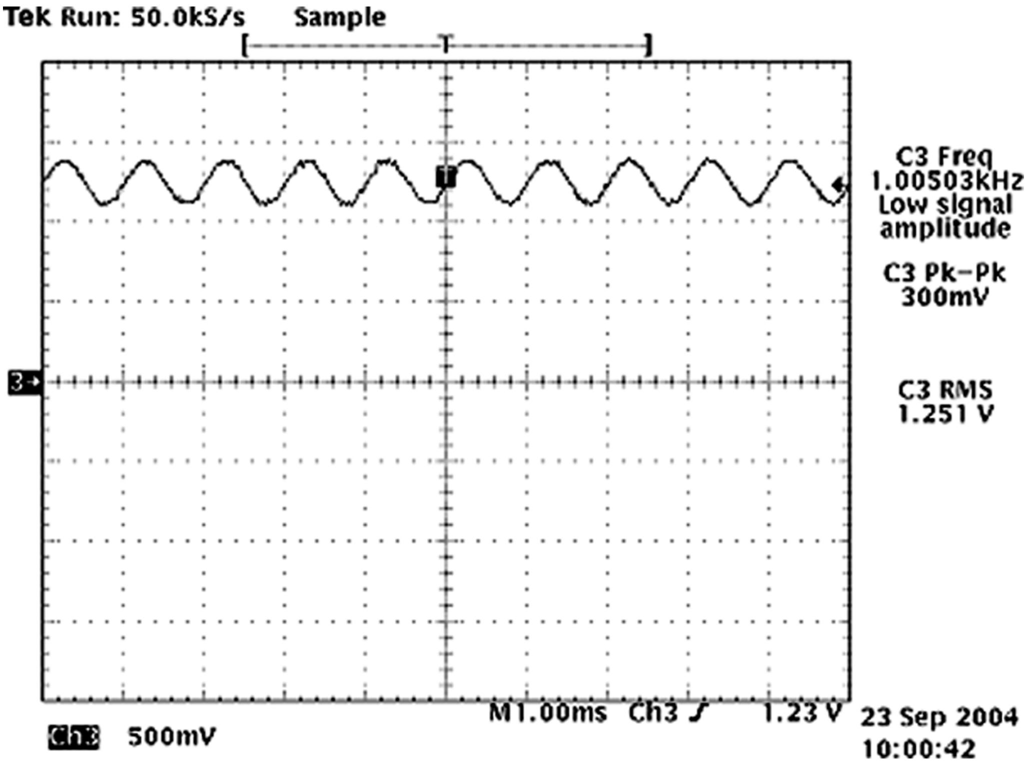
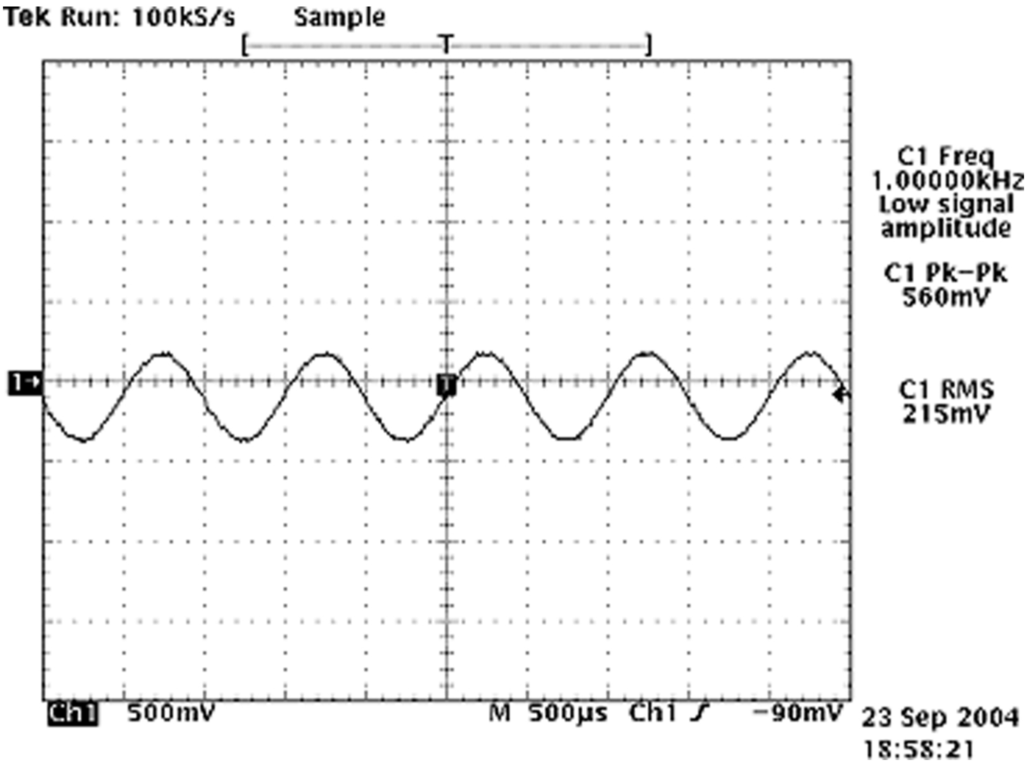


Figure 55 Single-ended output waveform of the Ext_in_HP_out measurement when earpiece is connected.



If a special low-pass filter designed for measuring digital amplifiers is unavailable, the measurement must be performed with a current probe and the input signal frequency must be 2kHz.

Figure 56 Differential output waveform of the Ext_in_IHF_out out loop measurement when speaker is connected.

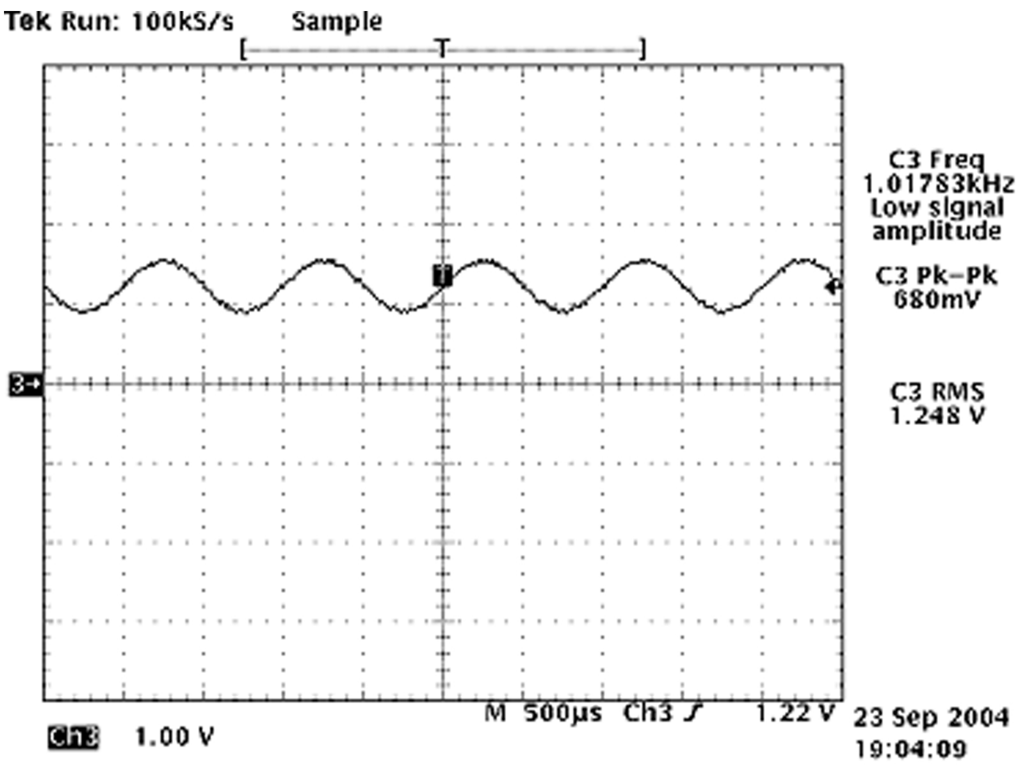
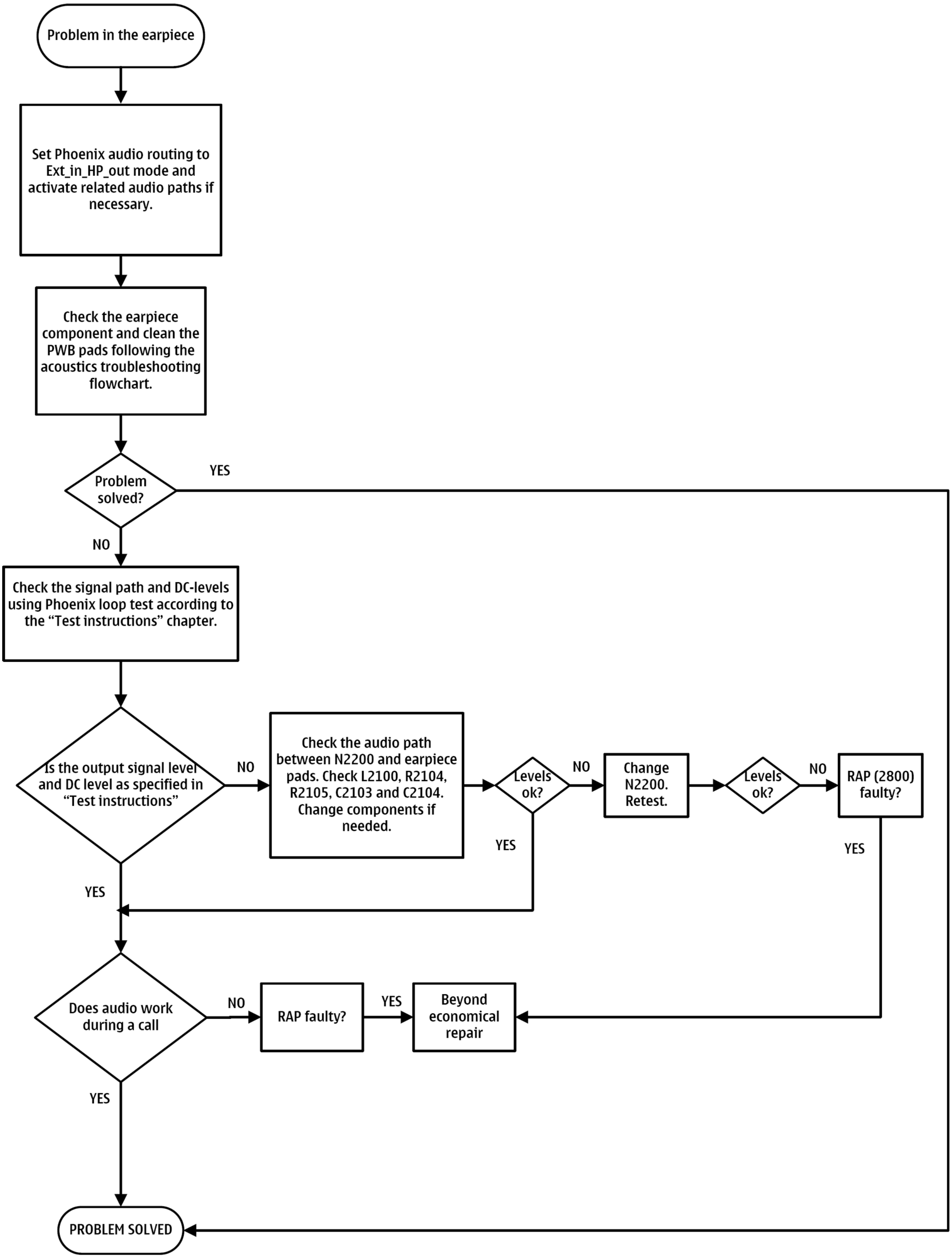


Figure 57 Single-ended output waveform of the HP_in_Ext_out loop when microphone is connected.

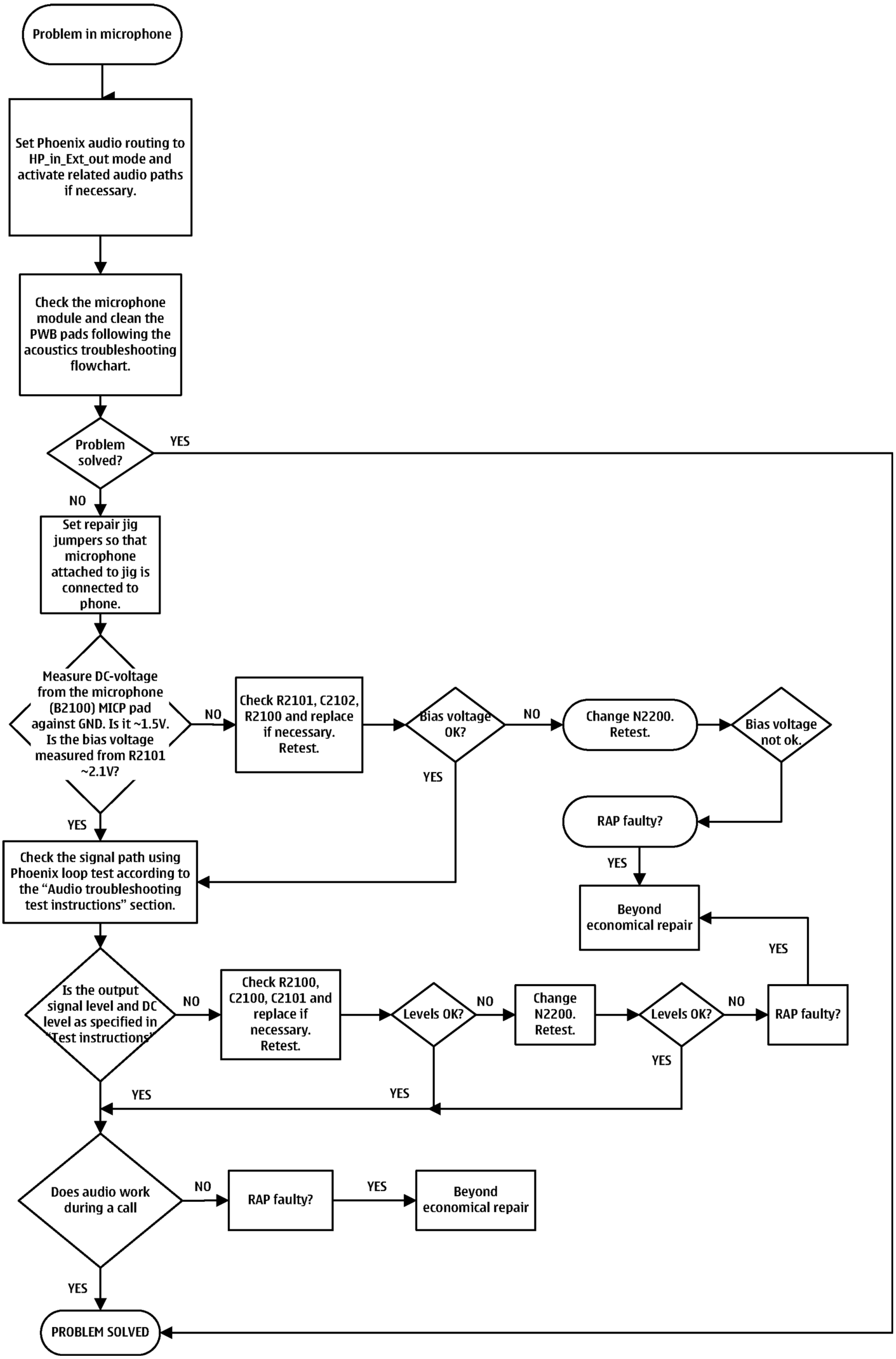
Internal earpiece troubleshooting

Troubleshooting flow


Problem in the earpiece
Set Phoenix audio routing to Ext_in_HP_out mode and activate related audio paths if necessary.
Check the earpiece component and clean the PWB pads following the acoustics troubleshooting flowchart.
Problem solved?
YES
NO
Check the signal path and DC-levels using Phoenix loop test according to the “Test instructions” chapter.
Is the output signal level and DC level as specified in “Test instructions”
NO
Check the audio path between N2200 and earpiece pads. Check L2100, R2104, R2105, C2103 and C2104. Change components if needed.
Levels ok?
NO
Change N2200. Retest.
Levels ok?
NO
RAP (2800) faulty?
YES
YES
YES
Does audio work during a call
NO
RAP faulty?
YES
Beyond economical repair
YES
PROBLEM SOLVED

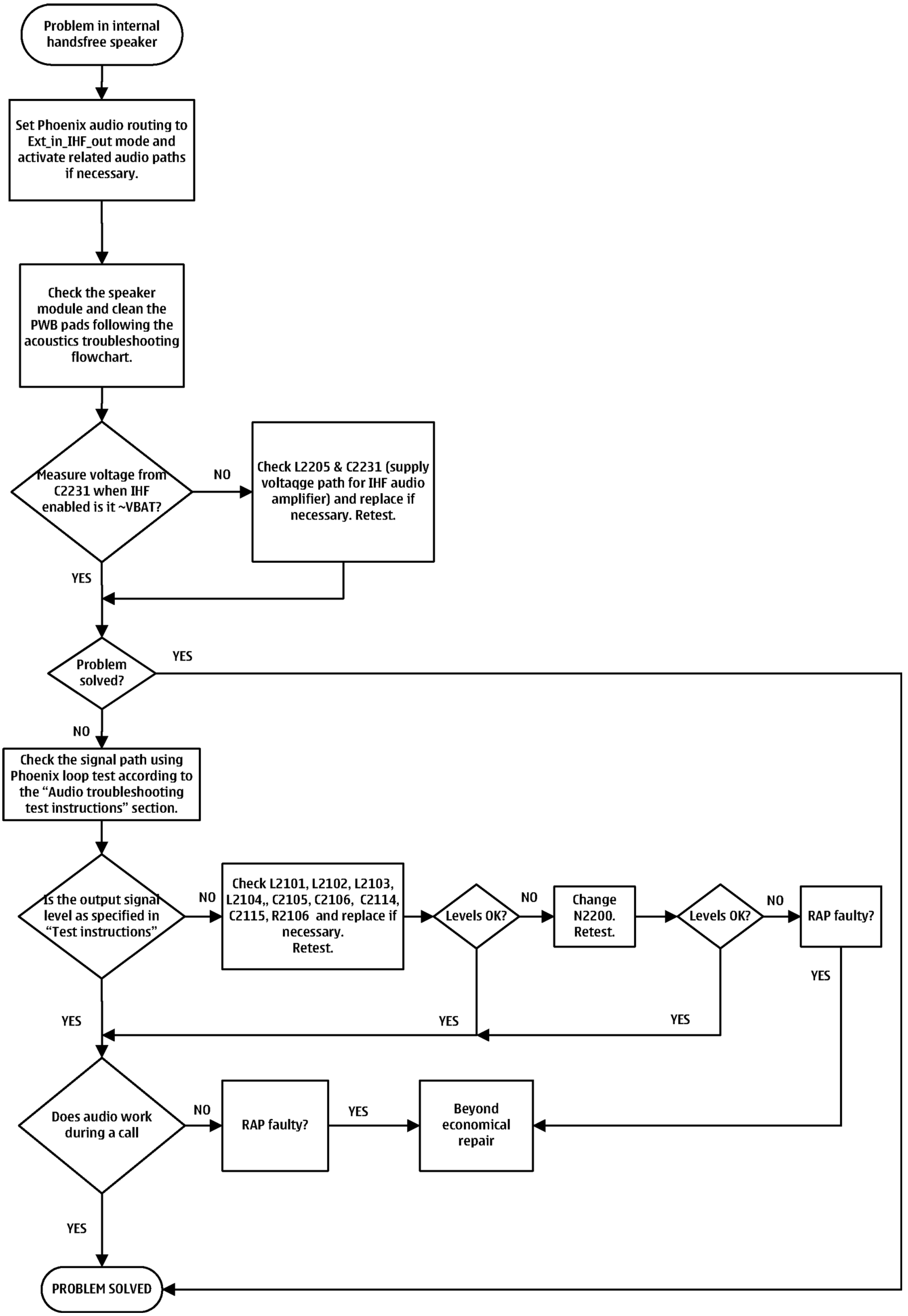
Internal microphone troubleshooting

Troubleshooting flow


Problem in microphone
Set Phoenix audio routing to HP_in_Ext_out mode and activate related audio paths if necessary.
Check the microphone module and clean the PWB pads following the acoustics troubleshooting flowchart.
Problem solved?
YES
NO
Set repair jig jumpers so that microphone attached to jig is connected to phone.
Measure DC-voltage from the microphone (B2100) MICP pad against GND. Is it ~1.5V. Is the bias voltage measured from R2101 ~2.1V?
NO
Check R2101, C2102, R2100 and replace if necessary. Retest.
Bias voltage OK?
NO
Change N2200. Retest.
Bias voltage not ok.
RAP faulty?
YES
Beyond economical repair
YES
YES
Check the signal path using Phoenix loop test according to the "Audio troubleshooting test instructions" section.
Is the output signal level and DC level as specified in "Test instructions"
NO
Check R2100, C2100, C2101 and replace if necessary. Retest.
Levels OK?
NO
Change N2200. Retest.
Levels OK?
NO
RAP faulty?
YES
YES
YES
YES
Does audio work during a call
NO
RAP faulty?
YES
Beyond economical repair
YES
PROBLEM SOLVED

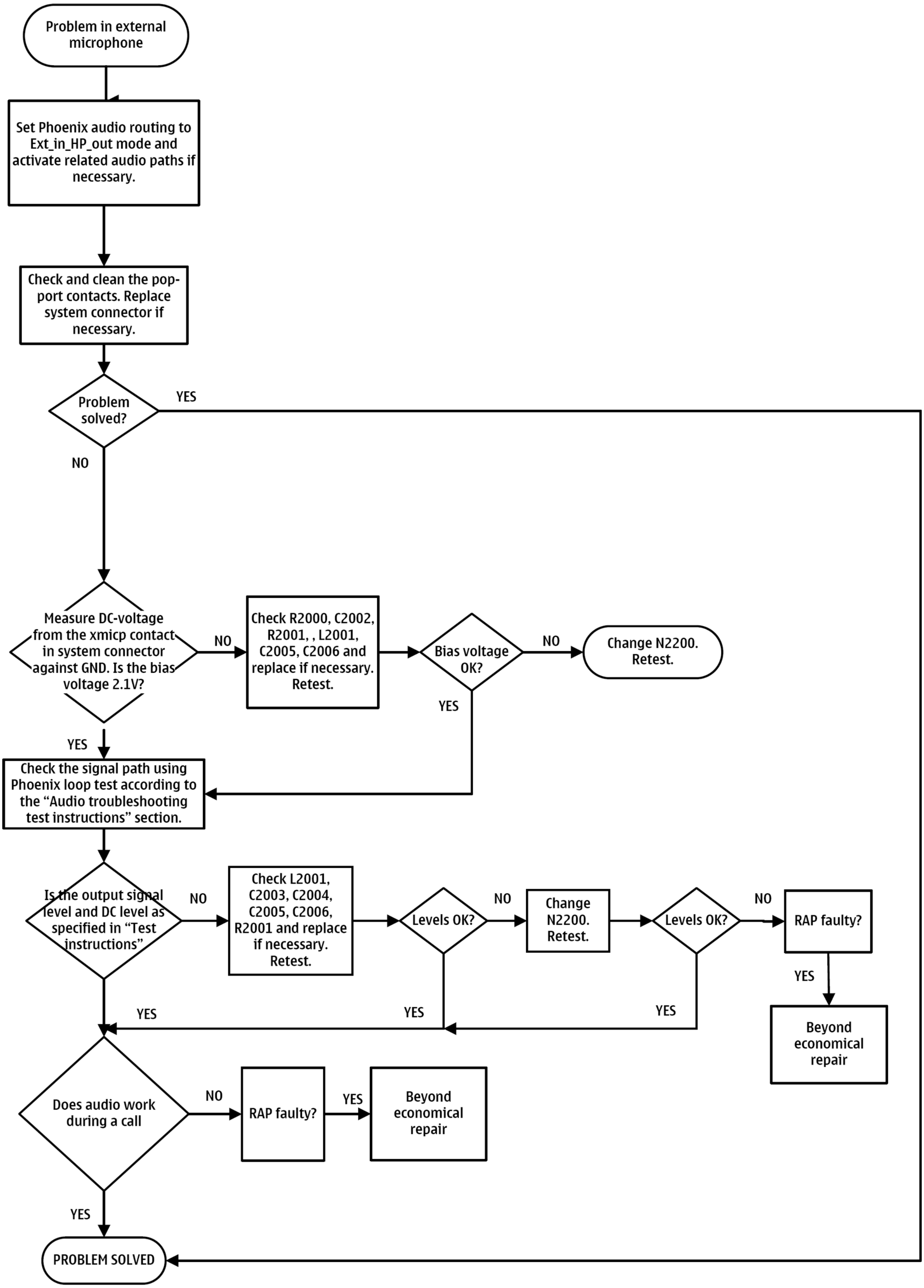
IHF troubleshooting

Troubleshooting flow


Problem in internal handsfree speaker
Set Phoenix audio routing to Ext_in_IHF_out mode and activate related audio paths if necessary.
Check the speaker module and clean the PWB pads following the acoustics troubleshooting flowchart.
Measure voltage from C2231 when IHF enabled is it ~VBAT?
NO
Check L2205 & C2231 (supply voltaqge path for IHF audio amplifier) and replace if necessary. Retest.
YES
Problem solved?
YES
NO
Check the signal path using Phoenix loop test according to the “Audio troubleshooting test instructions” section.
Is the output signal level as specified in “Test instructions”
NO
Check L2101, L2102, L2103, L2104,, C2105, C2106, C2114, C2115, R2106 and replace if necessary. Retest.
Levels OK?
NO
Change N2200. Retest.
Levels OK?
NO
RAP faulty?
YES
YES
YES
YES
Does audio work during a call
NO
RAP faulty?
YES
Beyond economical repair
YES
PROBLEM SOLVED

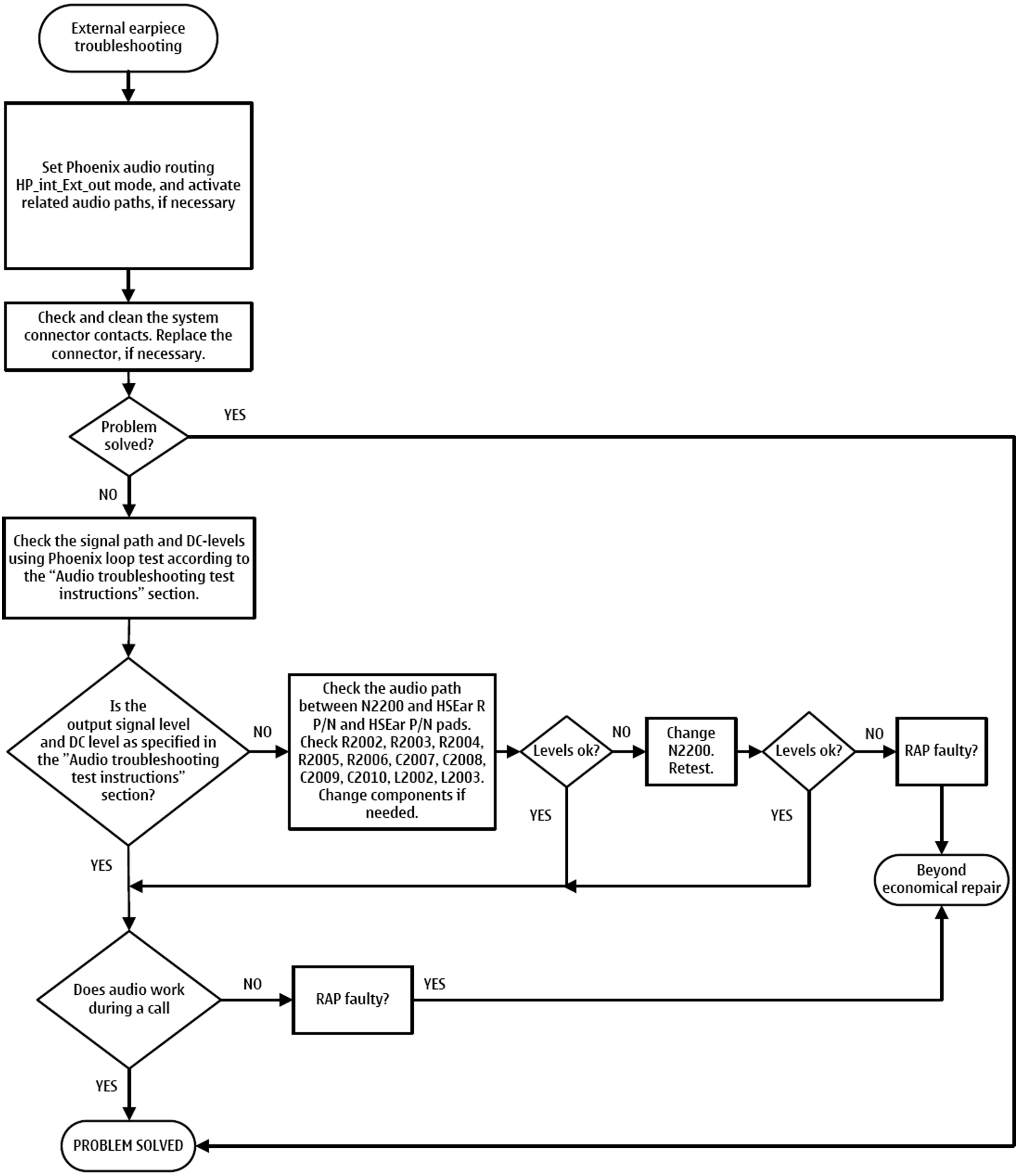
External microphone troubleshooting

Troubleshooting flow


Problem in external microphone
Set Phoenix audio routing to Ext_in_HP_out mode and activate related audio paths if necessary.
Check and clean the pop-port contacts. Replace system connector if necessary.
Problem solved?
YES
NO
Measure DC-voltage from the xmicp contact in system connector against GND. Is the bias voltage 2.1V?
NO
Check R2000, C2002, R2001, , L2001, C2005, C2006 and replace if necessary. Retest.
Bias voltage OK?
NO
Change N2200. Retest.
YES
YES
Check the signal path using Phoenix loop test according to the "Audio troubleshooting test instructions" section.
Is the output signal level and DC level as specified in "Test instructions"
NO
Check L2001, C2003, C2004, C2005, C2006, R2001 and replace if necessary. Retest.
Levels OK?
NO
Change N2200. Retest.
Levels OK?
NO
RAP faulty?
YES
Beyond economical repair
YES
YES
YES
Does audio work during a call
NO
RAP faulty?
YES
Beyond economical repair
YES
PROBLEM SOLVED

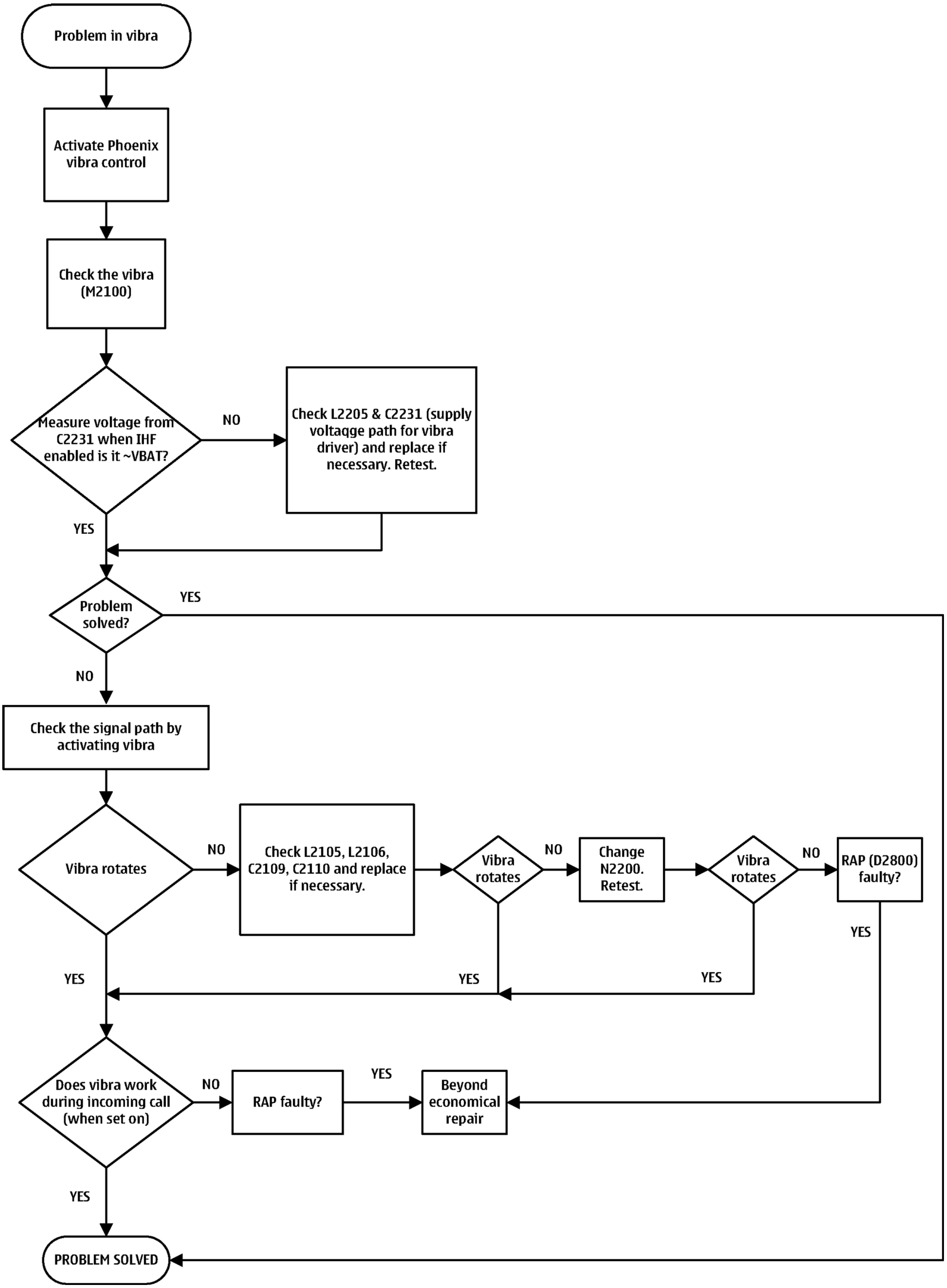
External earpiece troubleshooting

Troubleshooting flow


External earpiece troubleshooting
Set Phoenix audio routing HP_int_Ext_out mode, and activate related audio paths, if necessary
Check and clean the system connector contacts. Replace the connector, if necessary.
Problem solved?
YES
NO
Check the signal path and DC-levels using Phoenix loop test according to the "Audio troubleshooting test instructions" section.
Is the output signal level and DC level as specified in the "Audio troubleshooting test instructions" section?
NO
Check the audio path between N2200 and HSEar R P/N and HSEar P/N pads. Check R2002, R2003, R2004, R2005, R2006, C2007, C2008, C2009, C2010, L2002, L2003. Change components if needed.
Levels ok?
NO
Change N2200. Retest.
Levels ok?
NO
RAP faulty?
YES
YES
Beyond economical repair
YES
Does audio work during a call
NO
RAP faulty?
YES
YES
PROBLEM SOLVED

Vibra troubleshooting

Troubleshooting flow


Problem in vibra
Activate Phoenix vibra control
Check the vibra (M2100)
Measure voltage from C2231 when IHF enabled is it ~VBAT?
NO
Check L2205 & C2231 (supply voltagge path for vibra driver) and replace if necessary. Retest.
YES
Problem solved?
YES
NO
Check the signal path by activating vibra
Vibra rotates
NO
Check L2105, L2106, C2109, C2110 and replace if necessary.
Vibra rotates
NO
Change N2200. Retest.
Vibra rotates
NO
RAP (D2800) faulty?
YES
YES
YES
YES
Does vibra work during incoming call (when set on)
NO
RAP faulty?
YES
Beyond economical repair
YES
PROBLEM SOLVED

Baseband manual tuning guide

Energy management calibration

Before you begin

Energy Management (EM) calibration is performed to calibrate the setting (gain and offset) of AD converters in several channels (that is, **battery voltage**, **BSI**, **battery current**) to get an accurate AD conversion result.

Hardware setup:

- An external power supply is needed.
- Supply 12V DC from an external power supply to CU-4 to power up the phone.
- The phone must be connected to a CU-4 control unit with a product-specific flash adapter.

Steps

1. Place the phone to the docking station adapter (CU-4 is connected to the adapter).
2. Start *Phoenix* service software.
3. Choose **File→ Scan Product.**
4. Choose **Tuning→Energy Management Calibration.**
5. To show the current values in the phone memory, click **Read**, and check that communication between the phone and CU-4 works.
6. Check that the **CU-4 used** check box is checked.
7. Select the item(s) to be calibrated.

   Note: ADC calibration has to be performed before other item(s). However, if all calibrations are selected at the same time, there is no need to perform the ADC calibration first.

8. Click **Calibrate**.

   The calibration of the selected item(s) is carried out automatically.

   The candidates for the new calibration values are shown in the *Calculated values* column. If the new calibration values seem to be acceptable (please refer to the following "Calibration value limits" table), click **Write** to store the new calibration values to the phone permanent memory.

Table 4 Calibration value limits

Parameter	Min.	Max.
ADC Offset	-20	20
ADC Gain	12000	14000
BSI Gain	1100	1300
VBAT Offset	2400	2650
VBAT Gain	19000	23000
VCHAR Gain	N/A	N/A
IBAT (ICal) Gain	7750	12250

9. Click **Read**, and confirm that the new calibration values are stored in the phone memory correctly. If the values are not stored to the phone memory, click **Write** and/or repeat the procedure again.
10. To end the procedure, close the *Energy Management Calibration* window.

7 — RF Troubleshooting and Manual Tuning Guide

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Introduction to RF troubleshooting

All measurements should be done using:

- spectrum analyser with a high-frequency high-impedance passive probe (LO-/reference frequencies and RF power levels)
- oscilloscope with a 10:1 probe (DC-voltages and low frequency signals)

> **Caution:** A mobile phone WCDMA transmitter should never be tested with full Tx power, if there is no possibility to perform the measurements in a good performance RF-shielded room. Even low power WCDMA transmitters may disturb nearby WCDMA networks and cause problems to 3G cellular phone communication in wide area. WCDMA Tx measurements should be performed at least in an RF-shielded box and never with higher Tx power level than 0 dBm! Test full WCDMA Tx power only in RF-shielded environment.
>
> Also all measurements with an RF coupler should be performed in RF shielded environment because nearby base stations can disturb sensitive receiver measurements. If there is no possibility to use RF shielded environment, it should be checked that there are no transmissions on the same frequencies as used in the tests.

The RF section of the phone is build around two RF ASICS: Rx ASIC and Tx ASIC. There are also two PAs (Power Amplifiers) on board, one for GSM and another for WCDMA.

The WCDMA PA needs variable supply voltage to work properly, and therefore there is a switched mode power supply component added to the PWB. Please note that the grounding of the PA module is directly below the PA module. Therefore, it is difficult to check or change the module.

Most RF semiconductors are static discharge sensitive. ESD protection must be taken care of during repair (ground straps and ESD soldering irons). The RF ASICs, both PAs and SMPS are moisture sensitive, so parts must be pre-baked prior to soldering.

In addition to key components, there are lot of discrete components (resistors, inductors and capacitors) which troubleshooting is done mainly by checking if the soldering of the component is done properly.

A Capacitor can be checked for shorts and resistors for value by means of an ohmmeter, but be aware, in-circuit measurements should be evaluated carefully.

Keep in mind that all measured voltages or RF levels in the service manual are rough figures. Especially RF levels vary because of different measuring equipment or different grounding of the probe used. All spectrum analyser measurements in this manual are made with a Fluke PM9639/011 10:1 (500 ohm) probe. It is recommended that a similar kind of probe is used for all troubleshooting measurements.

When using an RF probe, use a pair of metallic tweezers to connect the probe ground to the PWB ground as close to the measurement point as possible. If measurements are performed in a product specific module jig, then “GND” pads should be used for the probe ground.

> **Note:** Phoenix pictures in this document may vary depending on what Phoenix version you are using. If pictures look different in this document than in your Phoenix, you should use your Phoenix values e.g. in the signal generator.

RF key component placement

The RF section of the phone is build around two RF ASICs, Rx ASIC N7500 and Tx ASIC N7501.

There are also two PAs on the board, one for GSM (N7502) and one for WCDMA (N7503). The WCDMA PA needs variable supply voltage to work power efficiently and therefore there is a Switched Mode Power Supply (SMPS) component (N7504) added to the PWB.

Receiver troubleshooting

Introduction to Rx troubleshooting

Rx can be tested by making a phone call or in the local mode. For the local mode testing, use Phoenix service software.

The primary Rx troubleshooting parameter RSSI (Receiving Signal Strength Indicator). For GSM RSSI measurement, see GSM Rx chain activation for manual measurements / GSM RSSI measurement (page 7–6), and for the same measurement in WCDMA, see WCDMA RSSI measurement (page 7–8).

In GSM, the input signal can be either a real GSM signal or a CW (Continuous Wave) signal, which is 67.771 kHz above the carrier frequency.

In WCDMA, the input signal can be either a real WCDMA signal or a CW signal, which is 1 MHz above the carrier frequency.

For service tool usage instructions, refer to section **Service Tools and Service Concepts**.

See also

- WCDMA Rx chain activation for manual measurement (page 7–7)

GSM Rx chain activation for manual measurements / GSM RSSI measurement

Context

RSSI signal measurement is the main Rx troubleshooting measurement. The test measures the strength of the received signal.

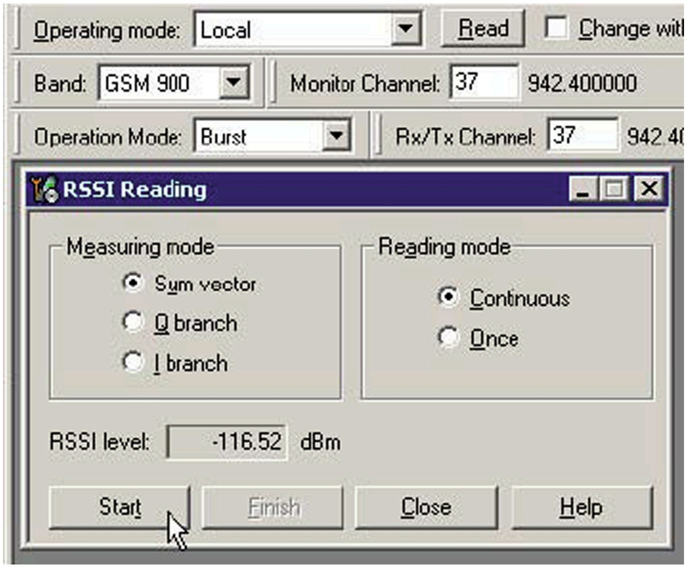
I and Q branches can be measured separately. In GSM, the input signal can be either real GSM signal or a CW (Continuous Wave) signal that is 67.771 kHz above the carrier frequency.

Steps

1. Start *Phoenix* service software.
2. Choose **Testing→GSM→RSSI Reading** .
3. Set the RF signal generator for channel frequency +67.771 kHz CW mode with –80 dBm signal.

   Alternatively set the cellular tester downlink channel to the appropriate channel. Make sure that the tester is set to continuous mode, not to burst mode.

4. In the *RSSI Reading* window, select the appropriate band and channel.


Operating mode: Local
☐ Change wit
Band: GSM 900
Monitor Channel: 37 942.400000
Operation Mode: Burst
Rx/Tx Channel: 37 942.4

RSSI Reading

Measuring mode
● Sum vector
○ Q branch
○ I branch

Reading mode
● Continuous
○ Once

RSSI level: -116.52 dBm

Figure 58 *RSSI Reading* window

5. To start the measurement, activate GSM Rx chain, click **Start**.

Results

RSSI reading values of the selected band and channel are displayed. The RSSI level must be the same value which is set at the signal generator (-90 dBm).

WCDMA Rx chain activation for manual measurement

Steps

1. Start *Phoenix* service software.
2. Choose **Testing→WCDMA→Rx Control** .
3. In the *Rx Control* window:

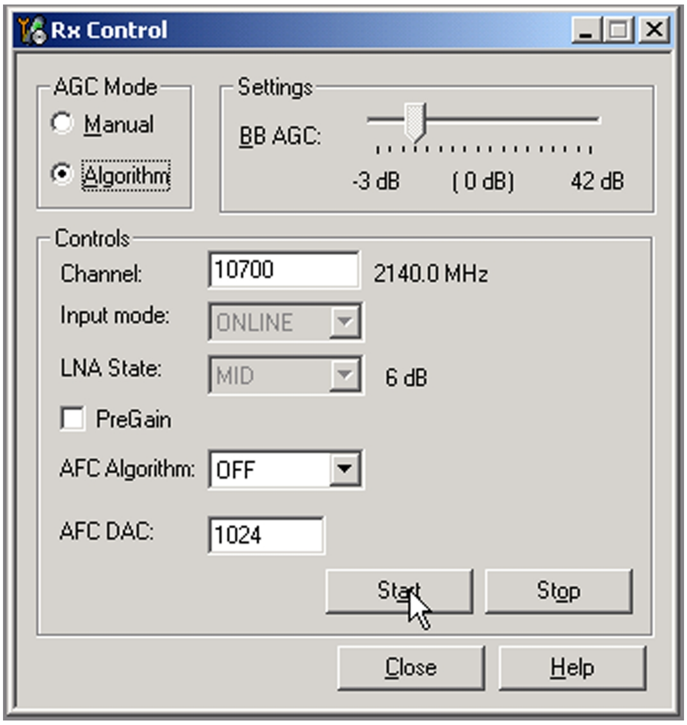

Rx Control
AGC Mode
○ Manual
● Algorithm
Settings
BB AGC:
-3 dB
(0 dB)
42 dB
Controls
Channel:
10700
2140.0 MHz
Input mode:
ONLINE
LNA State:
MID
6 dB
☐ PreGain
AFC Algorithm:
OFF
AFC DAC:
1024
Start
Stop
Close
Help

Figure 59 ***Rx Control*** **window**

- Set **AGC Mode** to **Algorithm**.
- Set **Channel** to **10700**.
- Set **AFC Algorithm** to **OFF** (Default = **OFF**).

Next action

When settings are ready, click **Start** to activate them.

If settings are changed later on (for example, you give a new channel number), you will need to click **Stop** and **Start** again.

Note: Clicking **Stop** also disables **Tx Control** if that was active!

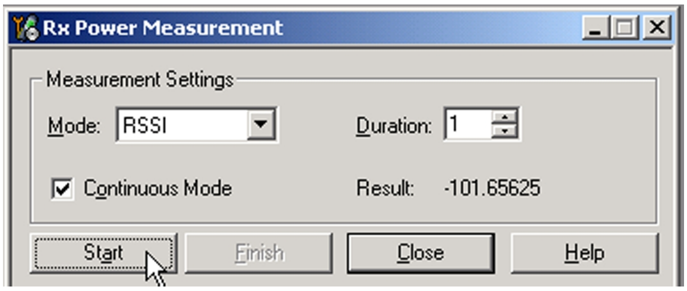
WCDMA RSSI measurement

Before you begin

WCDMA Rx must be activated before RSSI can be measured. See WCDMA Rx chain activation for manual measurement (page 7–7).

Steps

1. Start *Phoenix* service software.
2. Choose **Testing→WCDMA→Rx Power Measurement** .
3. In the *Rx Power Measurement* window, choose the following settings:
    - Mode: RSSI
    - Continuous Mode



Rx Power Measurement

Measurement Settings

Mode: RSSI

Duration: 1

☑ Continuous Mode

Result: -101.65625

4. To perform the measurement, click **Start**.

Transmitter troubleshooting

General instructions for Tx troubleshooting

Context

- Tx troubleshooting requires Tx operation.
- Do not transmit on frequencies that are in use.
- Transmitter can be controlled in the local mode for diagnostic purposes.
- The best diagnostic tool for GSM transmitter testing is **RF Controls**, and for the WCDMA transmitter testing **Tx Control**.

  Tx IQ tuning and Tx power tuning can be also used in some cases.
- Remember that retuning is not a repair procedure.

The first set of steps instructs how to assemble the test setup. This setup is general for all Tx troubleshooting tasks.

Alternative steps provide specific troubleshooting instructions for *Phoenix* service software. The first section is for the EGSM900/GSM1800/GSM1900 bands and the latter for WCDMA.

> **Caution:** Never activate the GSM or WCDMA transmitter without a proper antenna load. There should be always 50 ohm load connected to the RF connector (antenna, RF-measurement equipment or at least 2 watts dummy load), otherwise GSM or WCDMA PA may be damaged.

Steps

1. Connect a module jig to a computer with a DAU-9S cable or to a FPS-10 flash prommer with a modular cable.

   Make sure that you have a PKD-1 dongle connected to the computer parallel port.
2. Connect a DC power supply to a product-specific module jig.

   > **Note:** When repairing or tuning a transmitter, use an external DC supply with at least 3 A current capability.
   >
   > Set the DC supply voltage to 3.9 V.
3. Connect an RF cable between the RF connector of the product-specific module test jig and measurement equipment or alternatively use a 50 ohms (at least 2 W) dummy load in the module test jig RF connector; otherwise GSM or WCDMA PA may be damaged.

   > **Note:** There are three antenna connectors in the module jig:
   >
   > - one for GSM
   > - one for WCDMA
   > - one for Bluetooth and WLAN* (* = if applicable)
   >
   > Make sure that all connections are made to the correct RF connector.

   Normally a spectrum analyser is used as measurement equipment.

Note: The maximum input power of a spectrum analyser is +30 dBm.

To prevent any damage, it is recommended to use 10 dB attenuator on the spectrum analyzer input.

4. Set Tx on.

   i Place the phone module to the test jig and start *Phoenix* service software.

   ii Initialize connection to the phone (with FPS-10 use FBUS when using a DAU-9S cable and a COMBOX driver).

   iii Choose **File**→**Open Product**→**xx-x*** (* = type designator of the phone) or **File**→**Scan Product.** .

   iv From the toolbar, set **Operating mode** to **Local.**

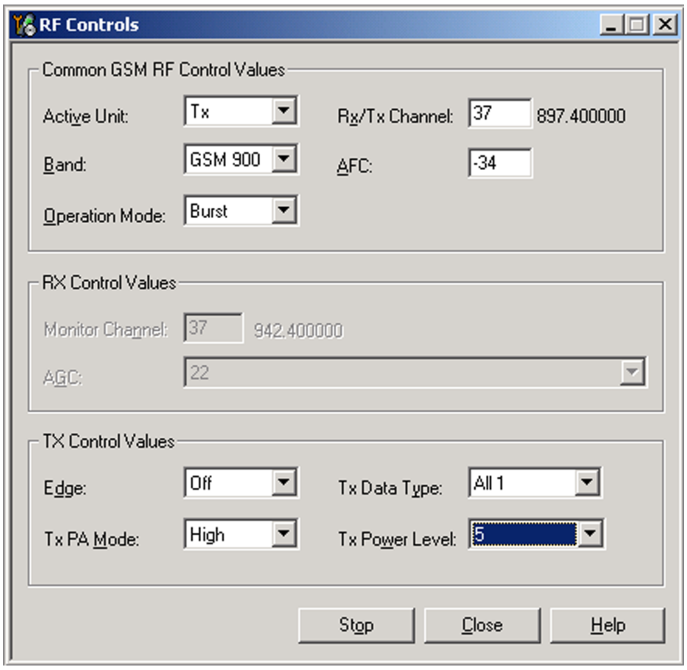
Alternative steps

- EGSM900/GSM1800/GSM1900 troubleshooting

  i Choose **Testing**→**GSM**→**RF Controls.**

  ii In the *RF Controls* window:

  - Choose **Band**: **GSM900** or **GSM1800** or **GSM1900** (Default = **GSM900**).
  - Set **Rx/Tx channel** in the following way:
    - GSM900: **37**
    - GSM1800: **700**
    - GSM1900: **661**
  - Set **Active unit** to **Tx** (Default = **Rx**).
  - Set **Operation Mode** to **Burst** (Default = **Burst**).
  - Set **Edge** to **Off** (Default).
  - Set **Tx Data Type** to **All 1** (Default = **All 1**).
  - Set **Tx PA Mode** to **High** (Default).
  - Set **Tx Power Level** in the following way:
    - GSM900: **5** (Default = **19**)
    - GSM1800: **0** (Default = **15**)
    - GSM1900: **0** (Default = **15**)



Common GSM RF Control Values
Active Unit: Tx
Rx/Tx Channel: 37 897.400000
Band: GSM 900
AFC: -34
Operation Mode: Burst

RX Control Values
Monitor Channel: 37 942.400000
AGC: 22

TX Control Values
Edge: Off
Tx Data Type: All 1
Tx PA Mode: High
Tx Power Level: 5

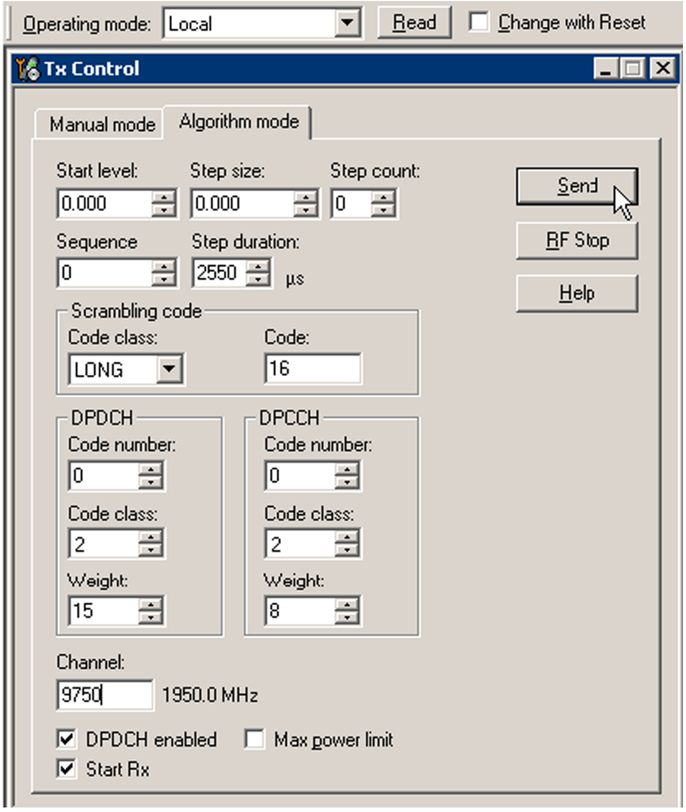
Figure 60 *RF Controls* window

- WCDMA troubleshooting

  i Choose **Testing→WCDMA→Tx Control.**

  ii In the *Tx Control* window:

  - Select the **Algorithm mode** tab.
  - Set **Start level** to **0** dBm (Default = **0**).
  - Set **Step size**, **Step count** and **Sequence** to **0** (Default = **0**).
  - In the **Scrambling code** pane set **Code class** to **LONG** (Default = **LONG**), and **Code** to **16** (Default = **16**).
  - For **DPDCH** set the following values:
    - **Code number**: **0**
    - **Code class**: **2**
    - **Weight**: **15**
  - For **DPCCH** set the following values:
    - **Code number**: **0**
    - **Code class**: **2**
    - **Weight**: **8**
  - Set **Channel** to **9750**.
  - Check the **DPDCH enabled** check box (Default).



Operating mode: Local

☐ Change with Reset

Start level: 0.000

Step size: 0.000

Step count: 0

Sequence: 0

Step duration: 2550 µs

Scrambling code

Code class: LONG

Code: 16

DPDCH

Code number: 0

Code class: 2

Weight: 15

DPCCH

Code number: 0

Code class: 2

Weight: 8

Channel: 9750 1950.0 MHz

☑ DPDCH enabled ☐ Max power limit

☑ Start Rx

Figure 61 ***Tx Control*** **window**

Next action

When settings are done, click **Send** to enable them.

If you change the settings (e.g. give a new channel number), you need to click **Stop** and **Send** again.

Checking antenna functionality

The main antenna has two separate antenna elements: GSM and WCDMA.

In the GSM antenna, there is one Feed and two GND contacts.

In the WCDMA antenna, there is one Feed and one GND contact.

The contacts of the GSM antenna are separated in the (RDC = 0 ohm) short-circuit. The contacts of the WCDMA antenna are in the (RDC = 0 ohm) short-circuit.

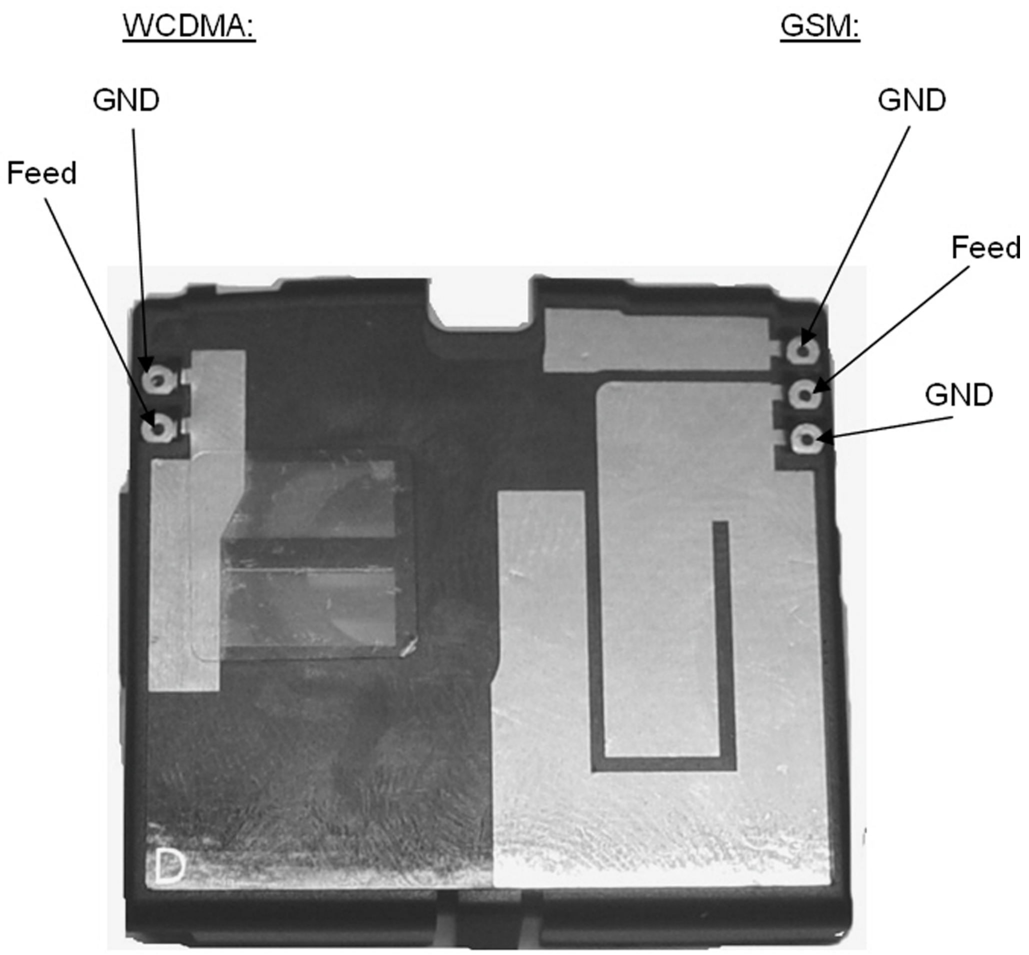


Figure 62 Feed and GND spots of the main antenna

The antenna is functioning normally when the contacts function (RDC = 0 ohm) and the antenna is visually intact.

BT antenna

BT antenna has one Feed and two GND contacts. The antenna is functioning normally when the contacts function (RDC = 0 ohm) and the antenna is visually intact.

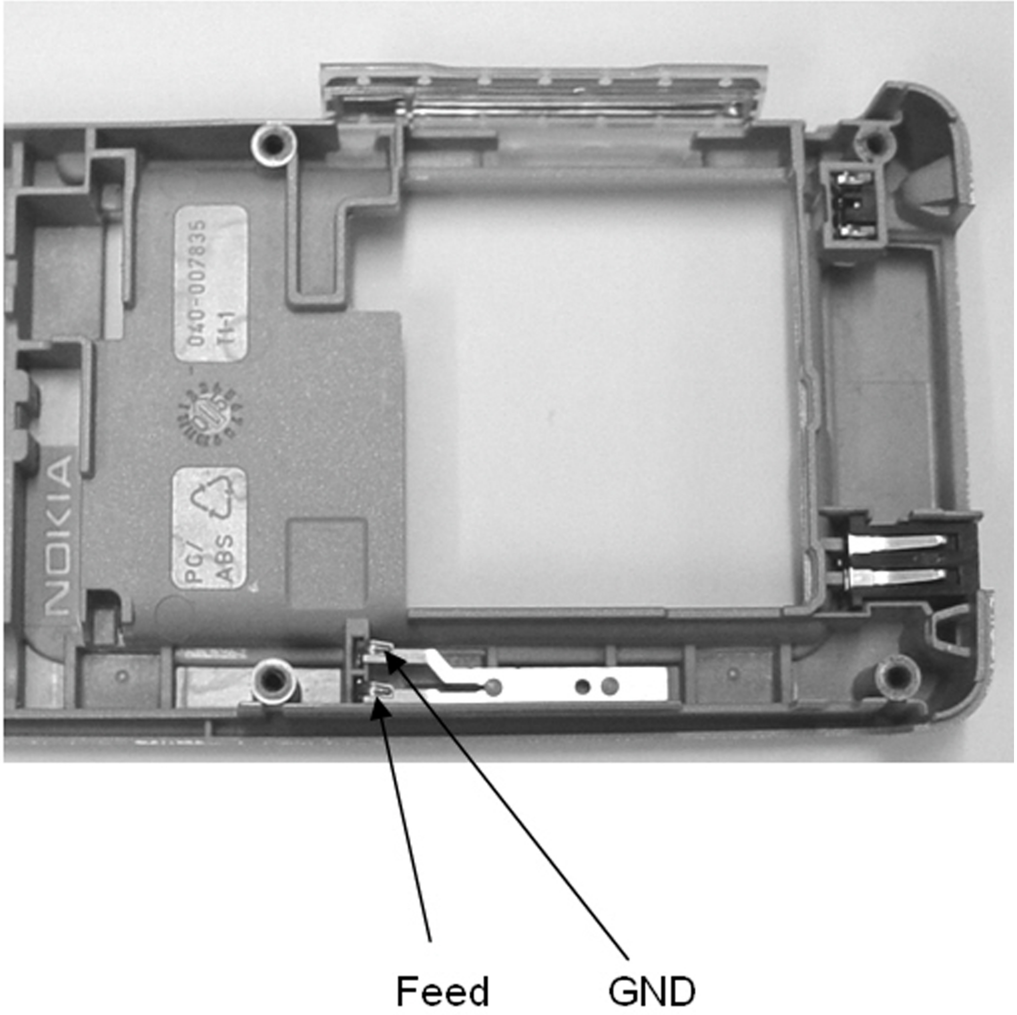


Figure 63 BT antenna

RF tunings

Introduction to RF tunings

Only perform RF tunings if:

- one or more of the RF components is changed
- A flash memory chip is changed or otherwise corrupted.

> **Caution:** RF calibration is always performed with the help of a product-specific module jig, never with an RF coupler. Using an RF coupler in the calibration phase results in a complete mistuning of the RF side.
>
> **Important:** After RF component changes, **always** use autotuning. Manual tunings are only required in rare cases.

Cable and adapter losses

RF cables and adapters have some losses. They have to be taken into account when the phone is tuned. As all the RF losses are frequency dependent, you have to be very careful and understand the measurement setup. The following table presents the RF attenuations of a product-specific module jig:

Band	Attenuation
GSM900	0.2 dB
GSM1800	0.4 dB
GSM1900	0.5 dB
WCDMA 2100	0.7 dB

RF autotuning

RF autotuning

Before you begin

For information on the recommended test set-up, refer to the corresponding information on the Partner Website or Nokia Online.

Before you can use the autotuning feature, the GPIB driver from the GPIB card vendor must be installed and running.

The autotune **.xml** file must be in a correct place: **C:\Program Files\Nokia\Phoenix\products\xx-x*\rfconf_xx-x*.xml** (**= indicates the type designator of the phone, e.g. RM-1*)

Context

RF autotuning is performed with the aid of a digital radio communication tester.

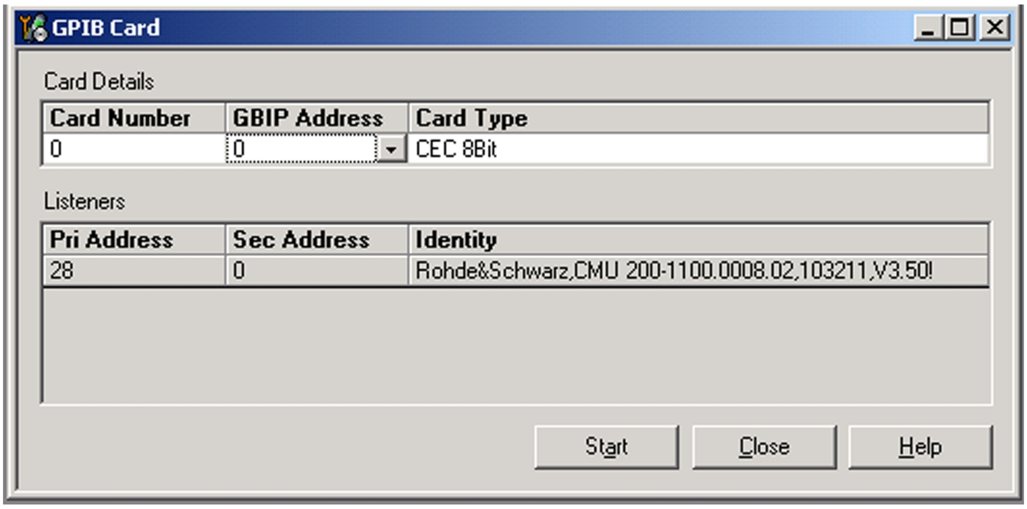
Autotuning covers all RF tunings that are needed to perform after RF component repairs.

> **Note:** Do not perform RF autotuning without a proper reason. Autotuning may only be performed after component repairs or if the RF tuning information is lost.

Steps

1. Connect the communication tester to the GPIB bus.
2. Start *Phoenix* service software.
3. Choose **Tools→Options→GPIB Card.**
4. From the **Card Type** drop-down menu, choose the GPIB card used, then click **Start**.

   The name of the communication tester appears in the **Listeners** pane.



GPIB Card

Card Details

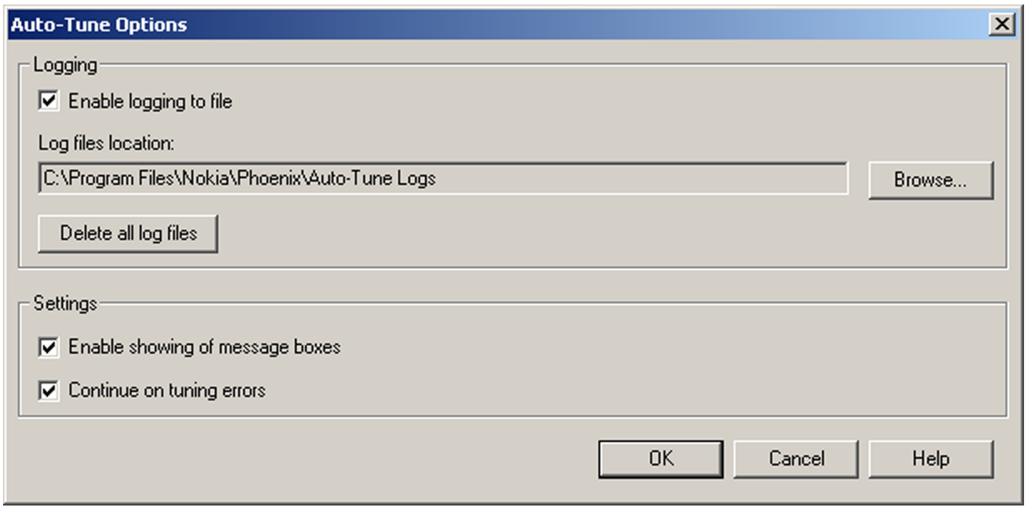
Card Number	GBIP Address	Card Type
0	0	CEC 8Bit

Listeners

Pri Address	Sec Address	Identity
28	0	Rohde&Schwarz,CMU 200-1100.0008.02,103211,V3.50!

5. To specify the cable loss from a module jig to the communication tester, choose **Set Loss** from the **Tuning** menu.
6. In the *Set Loss* window, click the **Jig** tab, and select the right jig for the phone from the drop-down list.

   Alternatively, you can add a new jig by clicking **Add**, and selecting the desired jig from the list.
7. Click the **Cable** tab and add the extra cable attenuation.
8. To start autotuning, choose **Auto-Tune** from the **Tuning** menu.
9. In the *Auto-Tune* window, click **Options**.
10. In the *Auto-Tune options* window, ensure the **Enable showing of message boxes** check box is checked, and click **OK**.


Auto-Tune Options
Logging
Browse...
Delete all log files
Settings
OK
Cancel
Help

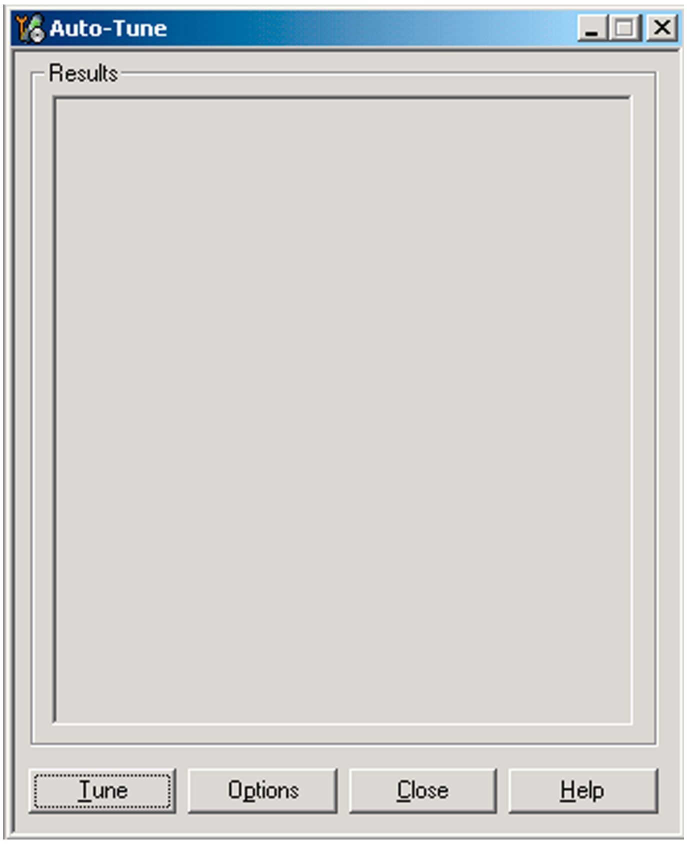
☑ Enable logging to file

Log files location:
C:\Program Files\Nokia\Phoenix\Auto-Tune Logs

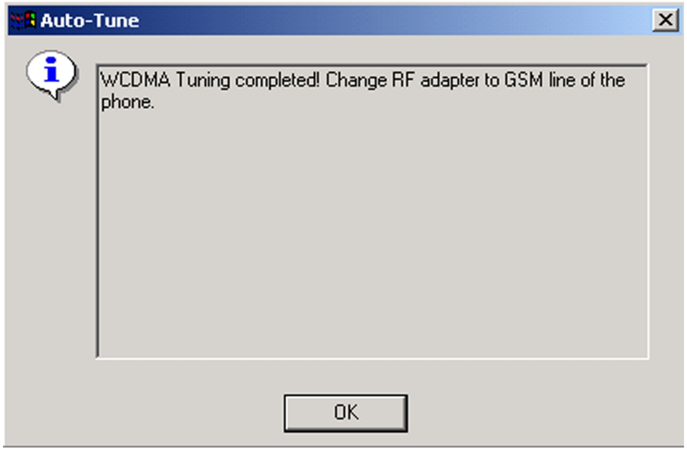
☑ Enable showing of message boxes

☑ Continue on tuning errors

11. Connect the phone WCDMA RF port to the communication tester, and click **Tune**.


Auto-Tune
Results
Tune
Options
Close
Help

12. Change the phone RF adapter from WCDMA port to GSM port.

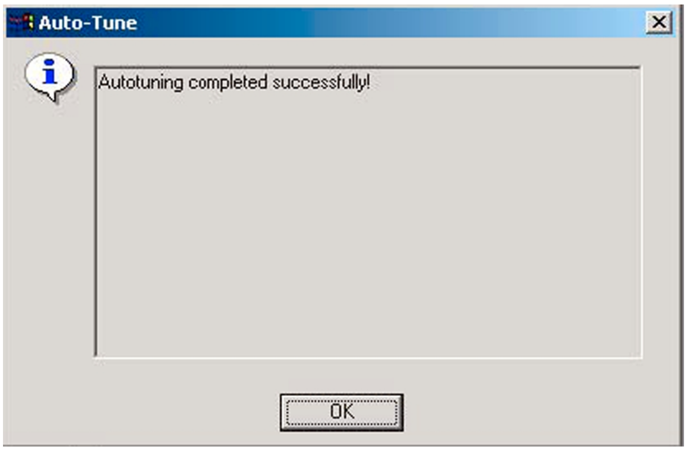


WCDMA Tuning completed! Change RF adapter to GSM line of the phone.

13. To complete the RF autotuning, click **OK**.

Results

Autotuning completed successfully! message appears.



Autotuning completed successfully!

RF manual tuning guide

Required manual tunings after component changes

Important: After RF component changes, **always** use autotuning. Manual tunings are only required in rare cases.

System mode independent manual tunings

Rf channel filter calibration

Context

Rf channel filter calibration tunes the internal low pass filters of Rx and Tx ASICs that limit the bandwidth of BB IQ signals.

One common calibration is made for both GSM and WCDMA.

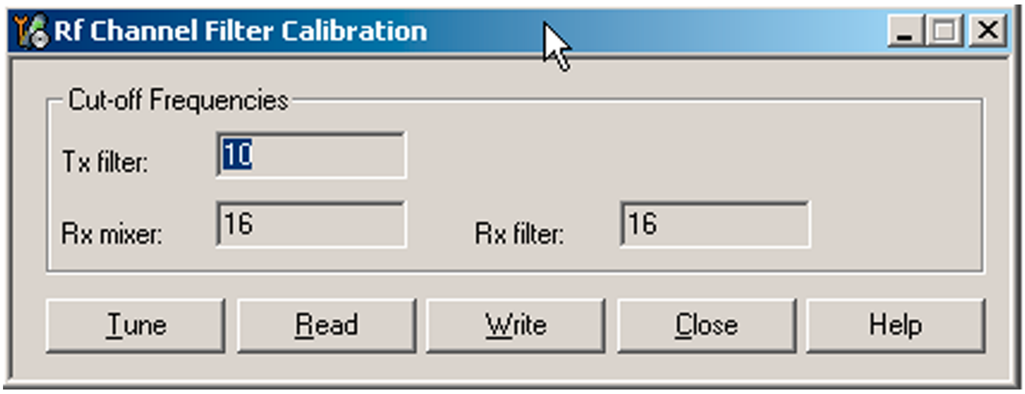
Table 5 Rf channel filter calibration tuning limits

	Min	Typ	Max
Tx filter	0	10	31
Rx filter	0	16	31

Steps

1. From the **Operating mode** drop-down menu, set mode to **Local**.
2. Choose **Tuning→Rf Channel Filter Calibration.**
3. Click **Tune**.
4. To save the values to the PMM (Phone Permanent Memory) area, click **Write**.
5. To end the tuning, click **Close**.

Results



Rf Channel Filter Calibration

Cut-off Frequencies

Tx filter: 10

Rx mixer: 16

Rx filter: 16

Figure 64 Rf channel filter calibration typical values

PA (power amplifier) detection

Context

The PA detection procedure detects which PA manufacturer is used for phone PAs.

If a PA is changed or if the permanent memory (PMM) data is corrupted, PA detection has to be performed before Tx tunings.

Steps

1. From the **Operating mode** drop-down menu, set mode to **Local**.
2. Choose **Tuning→PA Detection** .
3. Click **Tune**.
4. Check that the detected PA manufacturers are corresponding to the actual chips on the board.
5. To end the procedure, click **Close**.

Temperature sensor calibration

Context

There is a temperature sensor integrated into one of the device ASICs. The ASIC provides DC-voltage, which is temperature dependent.

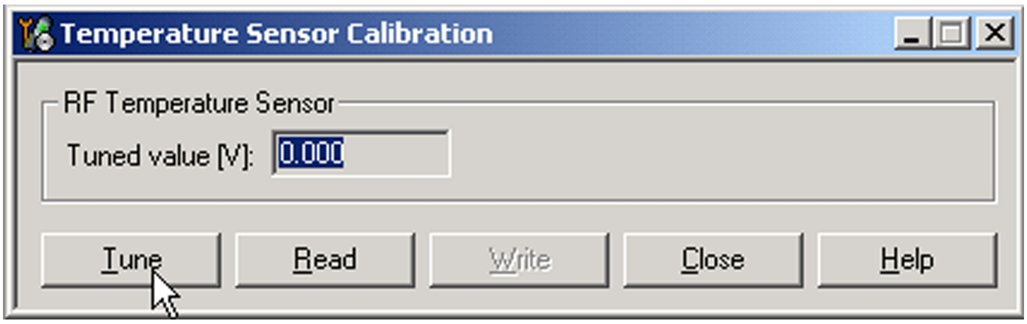
Temperature sensor calibration is done in room temperature, in which offset caused by the ASIC variation and AD-converter are nullified.

The module is able to do this calibration by itself, no external equipment is needed.

The temperature of the module and components must be 23 +/-2 degrees.

Steps

1. From the **Operating mode** drop-down menu, set mode to **Local**.
2. Choose **Tuning→Temperature Sensor Calibration** .
3. Click **Tune**.



Temperature Sensor Calibration

RF Temperature Sensor

Tuned value [V]: 0.000

Table 6 Temperature sensor calibration tuning limits

Min	Typ	Max	Unit
-20	-4	20	V

4. To save the calibration values, click **Write**.
5. To finish the calibration, click **Close**.

GSM receiver tunings

Rx calibration (GSM)

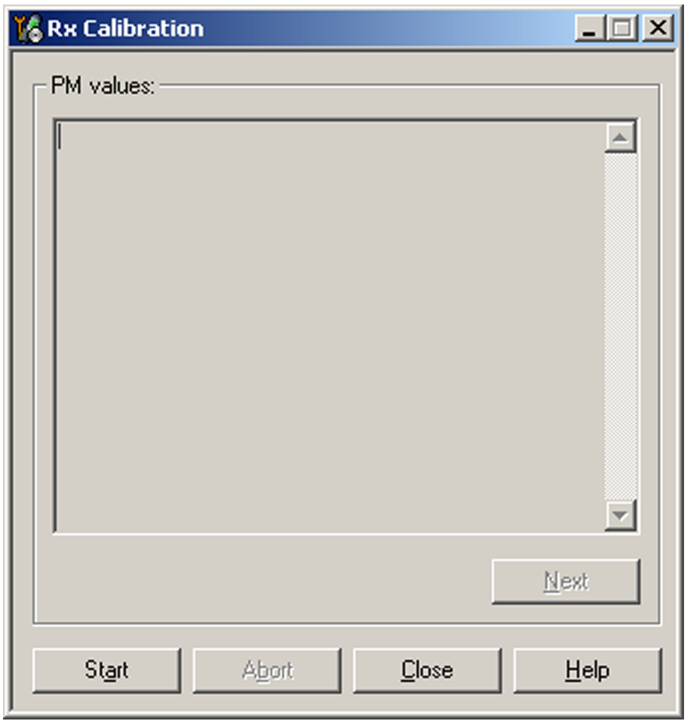
Context

Rx Calibration is used to find out the real gain values of the GSM Rx AGC system and tuning response of the AFC system (AFC D/A init value and AFC slope)

Steps

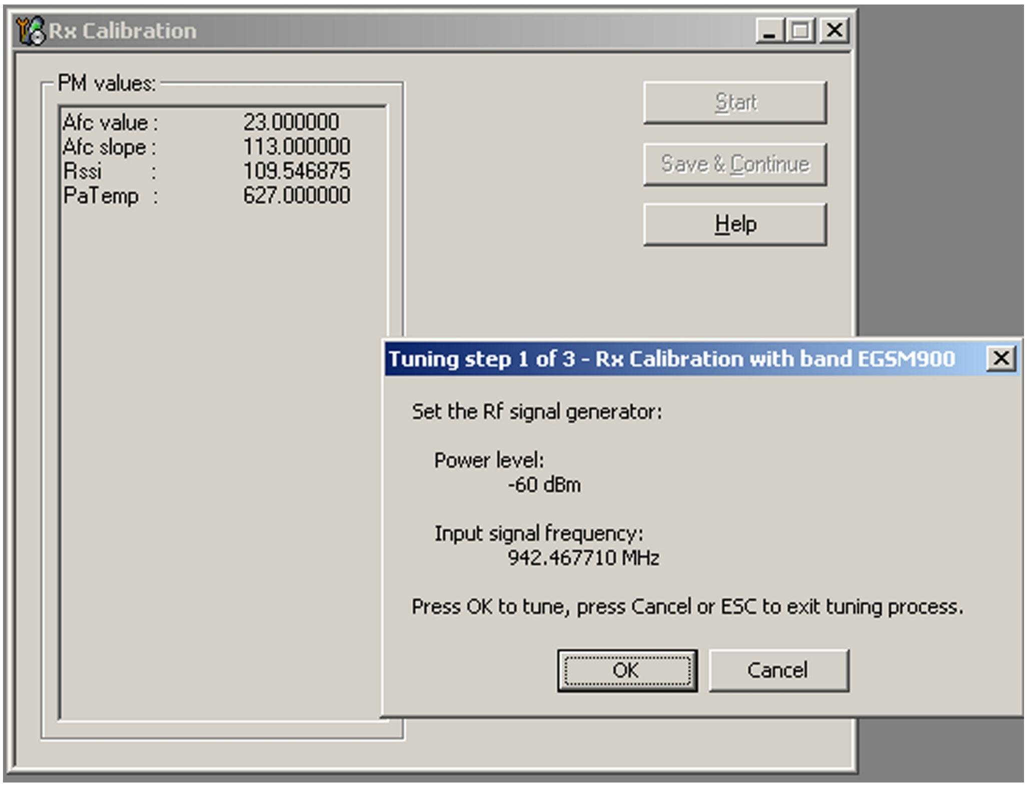
1. Connect the GSM connector of the module jig to a signal generator.
2. Start *Phoenix* service software.
3. Choose **File→Scan Product.**
4. From the **Operating mode** drop-down menu, set mode to **Local**.
5. Choose **Tuning→GSM→Rx Calibration.**

6. Click **Start**.


Rx Calibration
PM values:
Next
Start
Abort
Close
Help

7. Connect the signal generator to the phone and set frequency and amplitude as instructed in the *Tuning step 1 of 3 - Rx Calibration with band EGSM900* pop-up window.

    Note: The calibration uses a non-modulated CW signal. Increase the signal generator level by cable attenuation and module jig probe attenuation!


Rx Calibration
PM values:
Start
Save & Continue
Help
Tuning step 1 of 3 - Rx Calibration with band EGSM900
OK
Cancel

```
Afc value :     23.000000
Afc slope :     113.000000
Rssi      :     109.546875
PaTemp    :     627.000000
```

Set the Rf signal generator:

Power level:
-60 dBm

Input signal frequency:
942.467710 MHz

Press OK to tune, press Cancel or ESC to exit tuning process.

8. To perform the tuning, click **OK**.

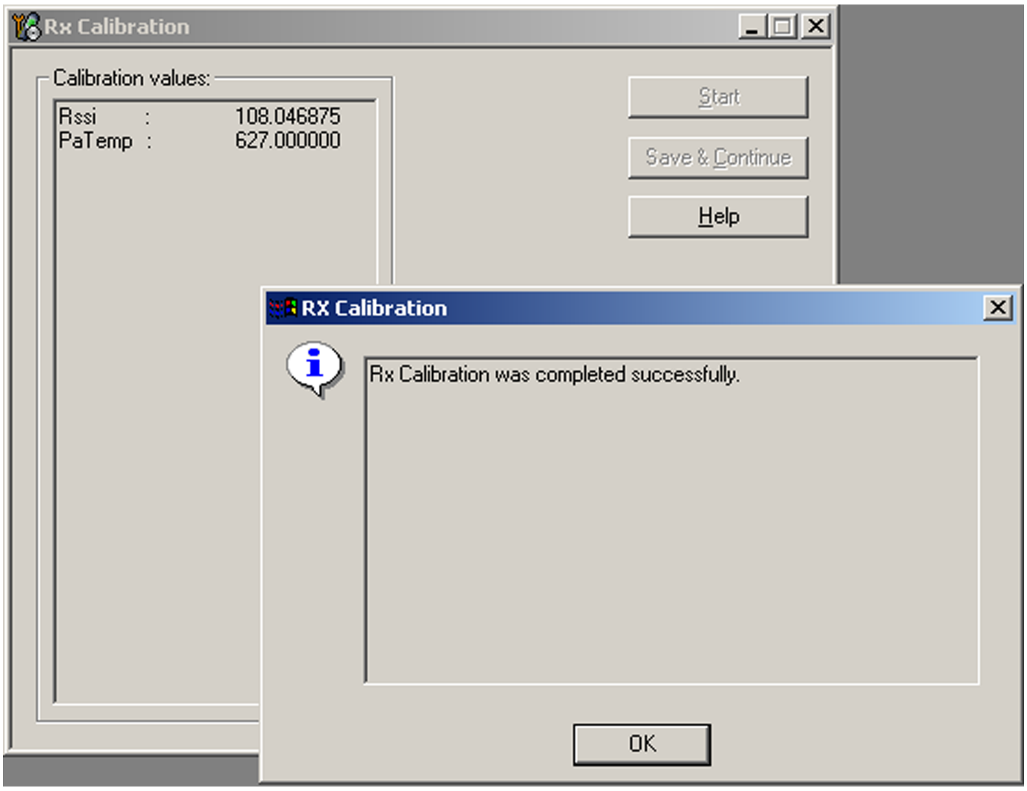
9. Check that the tuning values are within the limits specified in the following table:

Table 7 RF tuning limits in Rx calibration

	Min	Typ	Max	Unit
GSM900				
AFC Value	-200	-105...62	200	
AFC slope	0	122	200	
RSSI0	106	107...110	114	dB
GSM1800				
RSSI0	104	104...109	114	dB
GSM1900				
RSSI0	104	104...109	114	dB

10. When the first values have been written to the phone memory, click **Next** to change to the next band.
11. To finish the tuning, go through all bands, and click **Close**.

Results



Rssi : 108.046875
PaTemp : 627.000000

Rx Calibration was completed successfully.

Rx band filter response compensation (GSM)

Before you begin

Rx Calibration must be performed before the Rx Band Filter Response Compensation.

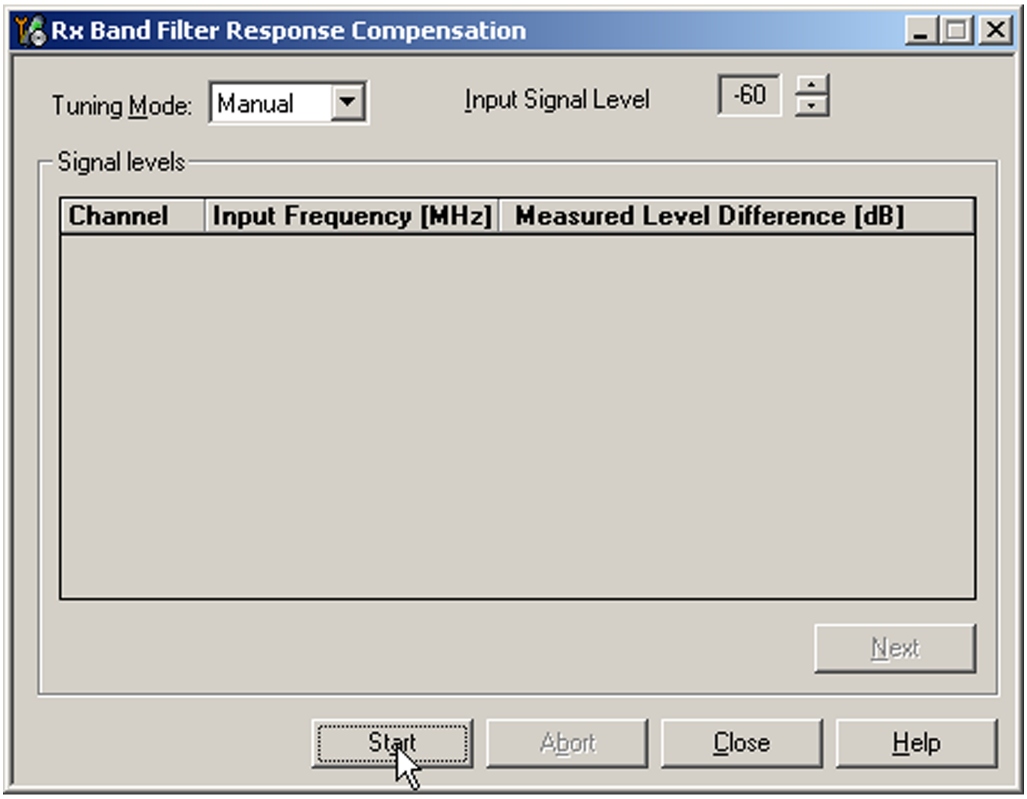
Context

On each GSM Rx band, there is a band rejecting filter in front of an RF ASIC front end. The amplitude ripple caused by these filters causes ripple to the RSSI measurement and therefore calibration is needed.

The calibration has to be repeated for each GSM band.

Steps

1. Connect the GSM connector of the module jig to a signal generator.
2. Start *Phoenix* service software.
3. Choose **File Scan Product**.
4. From the **Operating mode** drop-down menu, set mode to **Local**.
5. Select **GSM900** band.
6. Choose **Tuning→GSM→Rx Band Filter Response Compensation.**
7. From the *Tuning mode* drop-down menu, select **Manual**.
8. Click **Start**.



Rx Band Filter Response Compensation

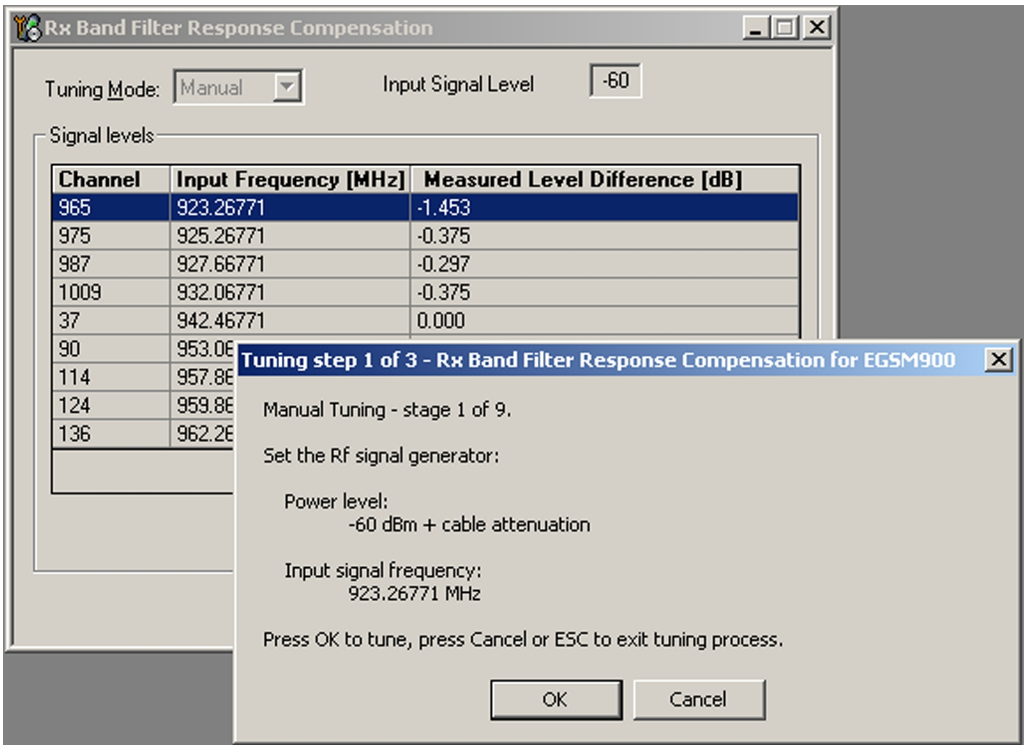
Tuning Mode: Manual

Input Signal Level -60

Signal levels

Channel	Input Frequency [MHz]	Measured Level Difference [dB]

9. Connect the signal generator to the phone and set frequency and amplitude as instructed in the *Tuning step 1 of 3 - Rx Band Filter Response Compensation for EGSM900* pop-up window.


Rx Band Filter Response Compensation
Signal levels
OK
Cancel

Tuning Mode: Manual

Input Signal Level: -60

Channel	Input Frequency [MHz]	Measured Level Difference [dB]
965	923.26771	-1.453
975	925.26771	-0.375
987	927.66771	-0.297
1009	932.06771	-0.375
37	942.46771	0.000
90	953.06	
114	957.86	
124	959.86	
136	962.26	

Tuning step 1 of 3 - Rx Band Filter Response Compensation for EGSM900

Manual Tuning - stage 1 of 9.

Set the Rf signal generator:

Power level:
-60 dBm + cable attenuation

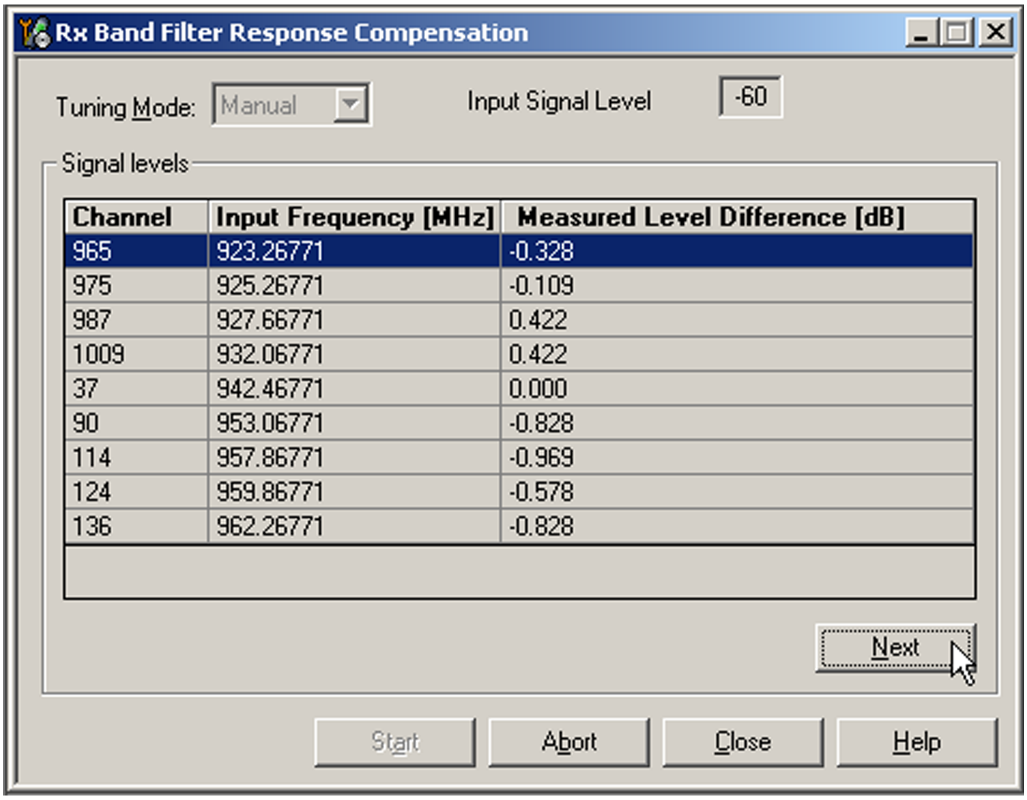
Input signal frequency:
923.26771 MHz

Press OK to tune, press Cancel or ESC to exit tuning process.

10. To perform the tuning, click **OK**.

11. Go through all 9 frequencies.

The following window appears, showing signal levels for the input frequencies:


Rx Band Filter Response Compensation
Signal levels
Next
Start
Abort
Close
Help

Tuning Mode: Manual

Input Signal Level: -60

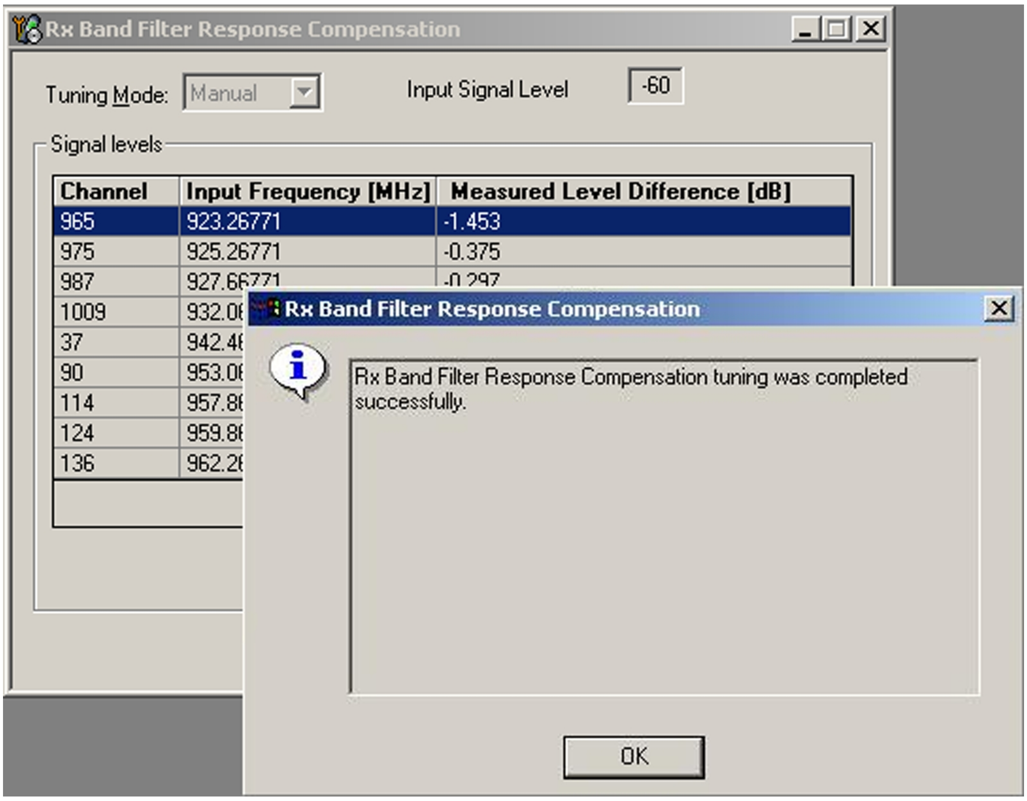
Channel	Input Frequency [MHz]	Measured Level Difference [dB]
965	923.26771	-0.328
975	925.26771	-0.109
987	927.66771	0.422
1009	932.06771	0.422
37	942.46771	0.000
90	953.06771	-0.828
114	957.86771	-0.969
124	959.86771	-0.578
136	962.26771	-0.828

12. Check that the tuning values are within the limits specified in the following table:

	Min	Typ	Max	Unit
GSM900				
Ch. 965 / 923.26771 MHz	-10	-1	5	dB
Ch. 975 / 925.26771 MHz	-3	0	5	dB
Ch. 987 / 927.66771 MHz	-3	0	5	dB
Ch. 1009 / 932.06771 MHz	-3	0	5	dB
Ch. 37 / 942.46771 MHz	-3	0	5	dB
Ch. 90 / 953.06771 MHz	-3	0	5	dB
Ch. 114 / 957.86771 MHz	-3	0	5	dB
Ch. 124 / 959.86771 MHz	-3	0	5	dB
Ch. 136 / 962.26771 MHz	-10	-1	5	dB
GSM1800				
Ch. 497 / 1802.26771 MHz	-10	-1	5	dB
Ch. 512 / 1805.26771 MHz	-3	0	5	dB
Ch. 535 / 1809.86771 MHz	-3	0	5	dB
Ch. 606 / 1824.06771 MHz	-3	0	5	dB
Ch. 700 / 1842.86771 MHz	-3	0	5	dB
Ch. 791 / 1861.06771 MHz	-3	0	5	dB
Ch. 870 / 1876.86771 MHz	-3	0	5	dB
Ch. 885 / 1879.86771 MHz	-3	0	5	dB
Ch. 908 / 1884.46771 MHz	-10	-1	5	dB
GSM1900				
Ch. 496 / 1927.06771 MHz	-10	-1	5	dB
Ch. 512 / 1930.26771 MHz	-3	0	5	dB
Ch. 537 / 1935.26771 MHz	-3	0	5	dB
Ch. 586 / 1945.06771 MHz	-3	0	5	dB
Ch. 661 / 1960.06771 MHz	-3	0	5	dB
Ch. 736 / 1975.06771 MHz	-3	0	5	dB
Ch. 794 / 1986.66771 MHz	-3	0	5	dB
Ch. 810 / 1989.86771 MHz	-3	0	5	dB
Ch. 835 / 1994.86771 MHz	-10	-1	5	dB

13. If the values are within the limits, click **Next** to continue with the next band.
14. Go through all bands, and click **Close** to end the tuning.

Results


Rx Band Filter Response Compensation
Signal levels
Rx Band Filter Response Compensation
OK

Tuning Mode: Manual

Input Signal Level -60

Channel	Input Frequency [MHz]	Measured Level Difference [dB]
965	923.26771	-1.453
975	925.26771	-0.375
987	927.66771	-0.297
1009	932.0	
37	942.4	
90	953.0	
114	957.8	
124	959.8	
136	962.2	

Rx Band Filter Response Compensation tuning was completed successfully.

Rx AM suppression (GSM)

Context

Rx AM suppression is used to tune the AM suppression capabilities of the GSM receiver.

AM suppression is related to the ability of the receiver to operate when there is a disturbing AM modulated signal near the received channel signal frequency.

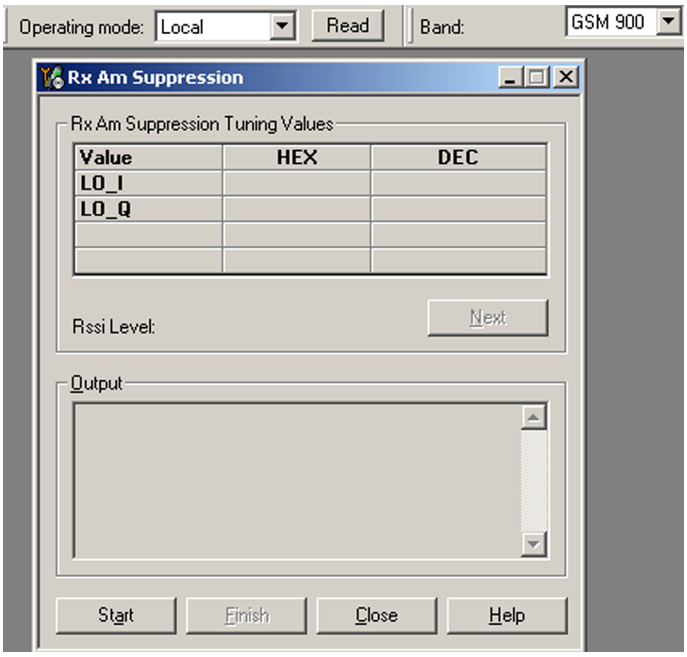
RFIC has a tunable compensation circuit which has an effect on the AM suppression ability.

In Rx AM suppression, a continuous signal accompanied with an AM modulated signal 10 MHz above the current channel is feed to the antenna. RFIC control word values are iterated until a minimum RSSI signal is found.

Steps

1. Connect the GSM connector of the module jig to a signal generator.
2. Start *Phoenix* service software.
3. Choose **File→Scan Product.**
4. From the drop-down menus, set **Operating mode** to **Local**, and select the **GSM900** band.
5. Choose **Tuning→GSM→Rx AM Suppression.**

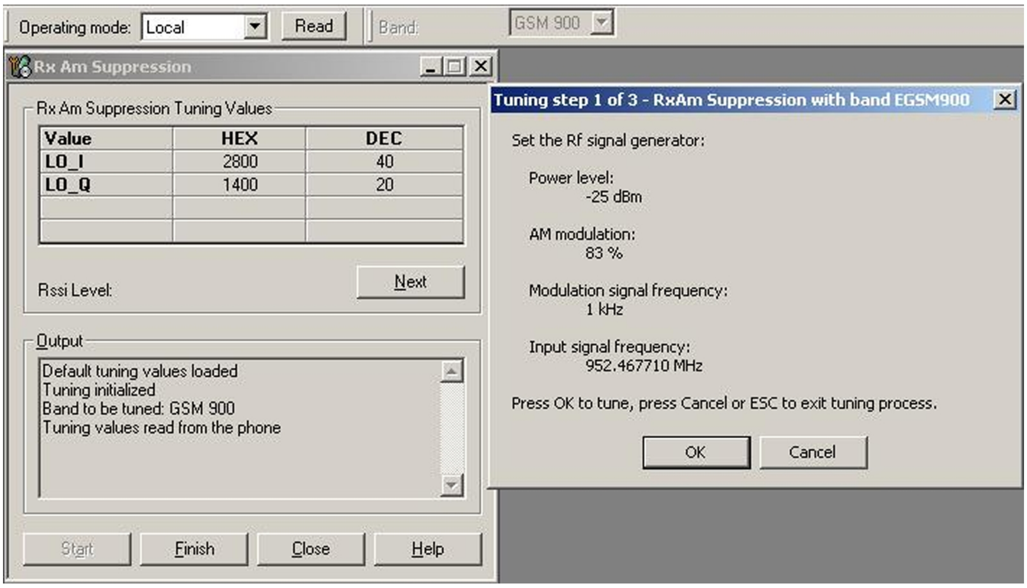
6. Click **Start**.


Read
Rx Am Suppression
Rx Am Suppression Tuning Values
Rssi Level:
Next
Output
Start
Finish
Close
Help

Operating mode: Local
Band: GSM 900

Value	HEX	DEC
LO_I		
LO_Q		

7. Connect the signal generator to the phone according to the frequency and modulation parameters displayed in the pop-up window:


Read
Rx Am Suppression
Rx Am Suppression Tuning Values
Rssi Level:
Next
Output
Start
Finish
Close
Help
Tuning step 1 of 3 - RxAm Suppression with band EGSM900
OK
Cancel

Operating mode: Local
Band: GSM 900

Value	HEX	DEC
LO_I	2800	40
LO_Q	1400	20

```
Default tuning values loaded
Tuning initialized
Band to be tuned: GSM 900
Tuning values read from the phone
```

Set the Rf signal generator:

Power level:
-25 dBm

AM modulation:
83 %

Modulation signal frequency:
1 kHz

Input signal frequency:
952.467710 MHz

Press OK to tune, press Cancel or ESC to exit tuning process.

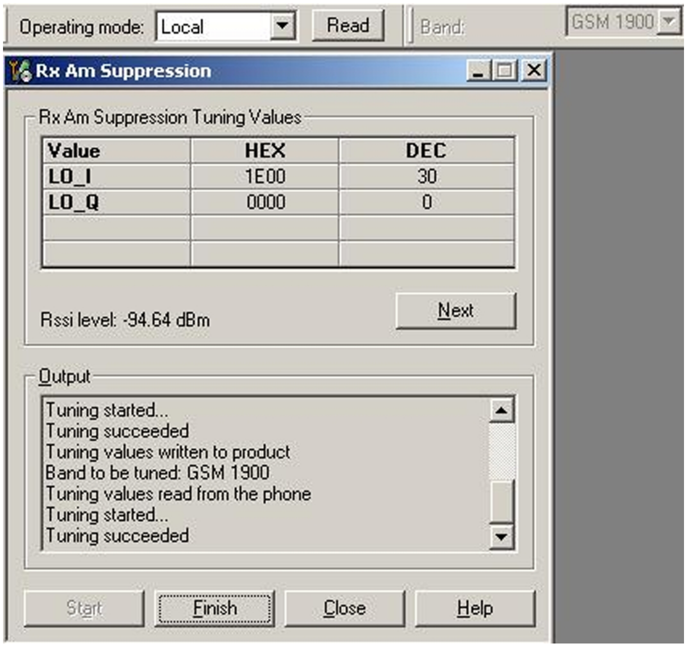
8. Click **OK**.

9. Check that RSSI level value is between the limits presented in the following table.

Table 8 RSSI level values

Band	Min	Max	Unit
GSM900	-115	-90	dB
GSM1800	-115	-85	dB
GSM1900	-115	-100	dB

10. To proceed to the next band, click **Next**.
11. Go through all bands.
12. To end the tuning, click **Finish** and **Close**.



Operating mode: Local
Band: GSM 1900

Value	HEX	DEC
LO_I	1E00	30
LO_Q	0000	0

Rssi level: -94.64 dBm

```
Tuning started...
Tuning succeeded
Tuning values written to product
Band to be tuned: GSM 1900
Tuning values read from the phone
Tuning started...
Tuning succeeded
```

GSM transmitter tunings

Tx IQ tuning (GSM)

Context

- The Tx path branches to I and Q signals at the RF I/Q modulator. Modulator and analog hardware located after the modulator cause unequal amplitude and phase disturbance to I and Q signal paths. Tx IQ tuning balances the I and Q branches.
- Tx IQ tuning must be performed on all GSM bands.

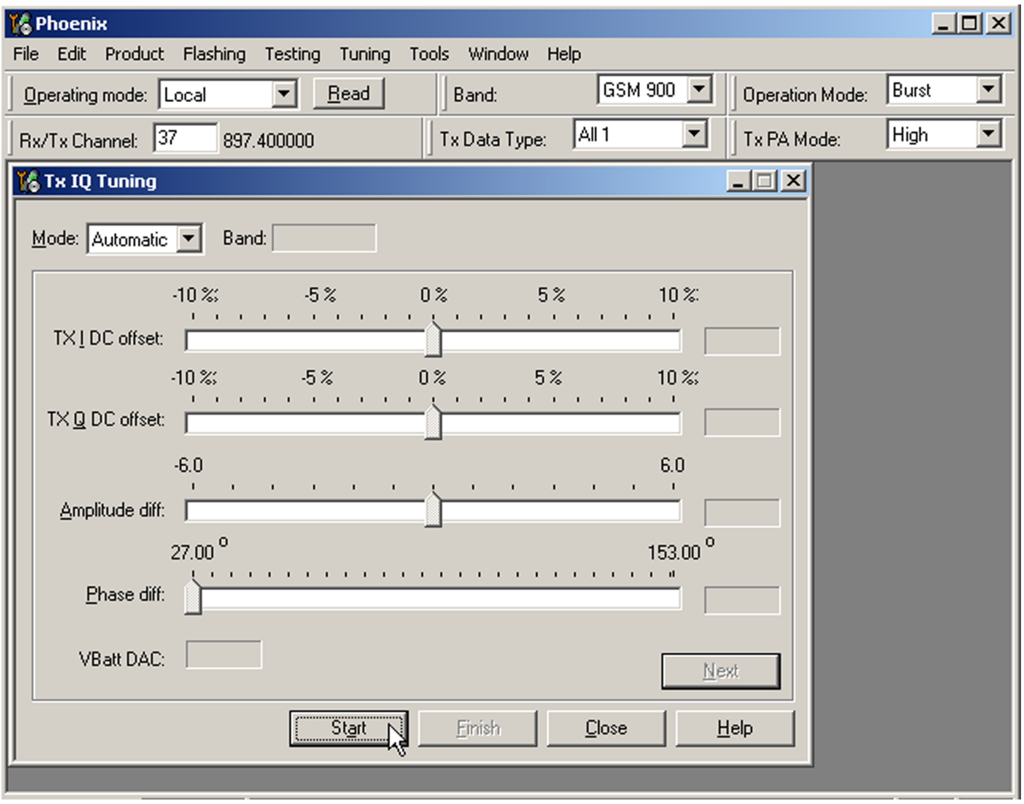
Steps

1. Start *Phoenix* service software.
2. Choose **File→Scan Product.**
3. From the **Operating mode** drop-down menu, set mode to **Local.**
4. Choose **Tuning→GSM→Tx IQ Tuning.**
5. In the *Tx IQ Tuning* window, set mode to **Automatic**.
6. Click **Start**.

   Wait until the automatic tuning feature has finished and moved the sliders.

   Values are written to the phone memory automatically.

   Tuning sliders should be close to the center of the scale after the tuning and within the limits specified in the following table.



Operating mode: Local
Band: GSM 900
Operation Mode: Burst
Rx/Tx Channel: 37 897.400000
Tx Data Type: All 1
Tx PA Mode: High

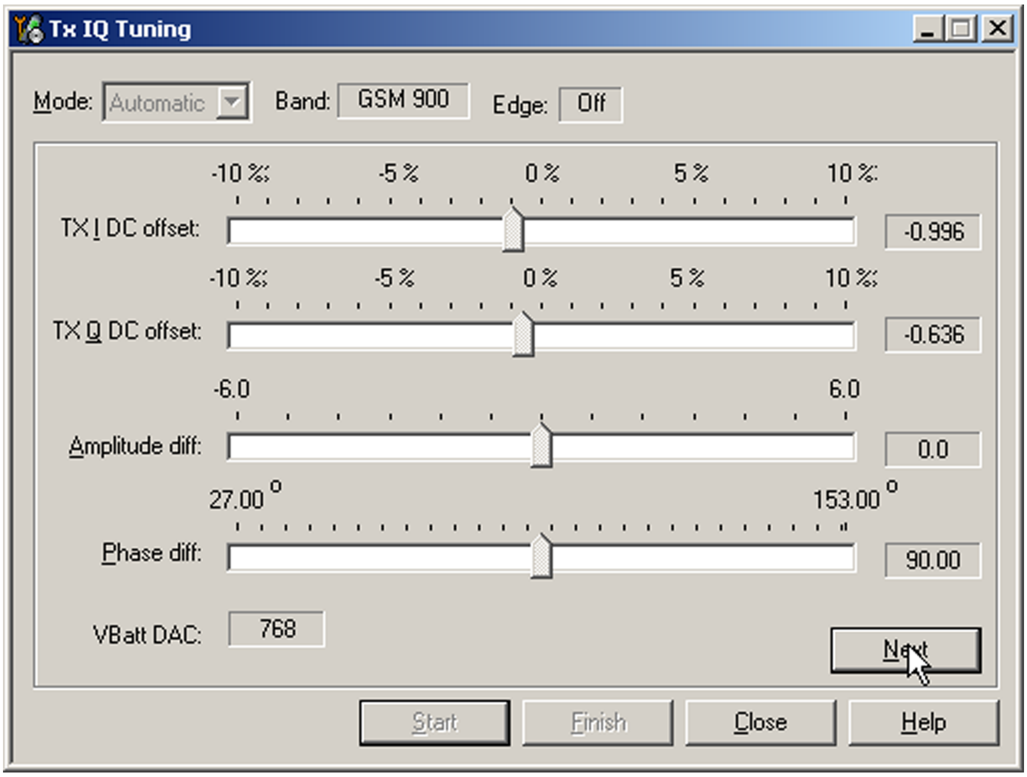
Mode: Automatic
Band:

Phoenix
File Edit Product Flashing Testing Tuning Tools Window Help
Read
Tx IQ Tuning
-10 % -5 % 0 % 5 % 10 %
TX I DC offset:
-10 % -5 % 0 % 5 % 10 %
TX Q DC offset:
-6.0 6.0
Amplitude diff:
27.00 ° 153.00 °
Phase diff:
VBatt DAC:
Next
Start
Finish
Close
Help

Table 9 Tx IQ tuning limits

	Min	Typ	Max	Unit
GSM900				
I DC offset / Q DC offset	-6	-4/4	6	dB
Ampl	-1	0	1	dB
Phase	85	90	95	dB
GSM1800/GSM1900				
I/Q DC	-6	-0.5/0.5	6	dB
Ampl	-1	0	1	dB
Phase	95	100	110	dB

7. When the first values have been written to the phone memory, click **Next** to continue to the next band.



Tx IQ Tuning

Mode: Automatic
Band: GSM 900
Edge: Off
TX I DC offset: -0.996
TX Q DC offset: -0.636
Amplitude diff: 0.0
Phase diff: 90.00
VBatt DAC: 768

8. Go through all bands.
9. When all bands have been tuned, click **Finish**, and **Close** to end the tuning procedure.

Next action

If the tuning values are not within the limits specified in the "Tx IQ tuning limits" table, start the procedure again, and check the Tx IQ quality manually.

Tx power level tuning (GSM)

Context

Because of variations in the integrated circuit process and discrete component values, the actual transmitter RF gain of each phone is different. Tx power level tuning is used to find out mapping factors called 'power coefficients'. These adjust the GSM transmitter output power to fulfill the specifications.

For EDGE transmission, the bias settings of the GSM PA are adjusted in order to improve linearity. This affects the PA gain and therefore the power levels have to be aligned separately for EDGE transmission.

Tx power level tuning has to be performed on all GSM bands.

Steps

1. Connect the phone to a spectrum analyzer.
2. Start *Phoenix* service software.
3. From the **Operating mode** drop-down menu, set mode to **Local**.
4. Choose **Tuning→GSM→Tx Power Level Tuning.**
5. Click **Start**.

   The current coefficients saved in the permanent memory (PM) of the terminal are shown.

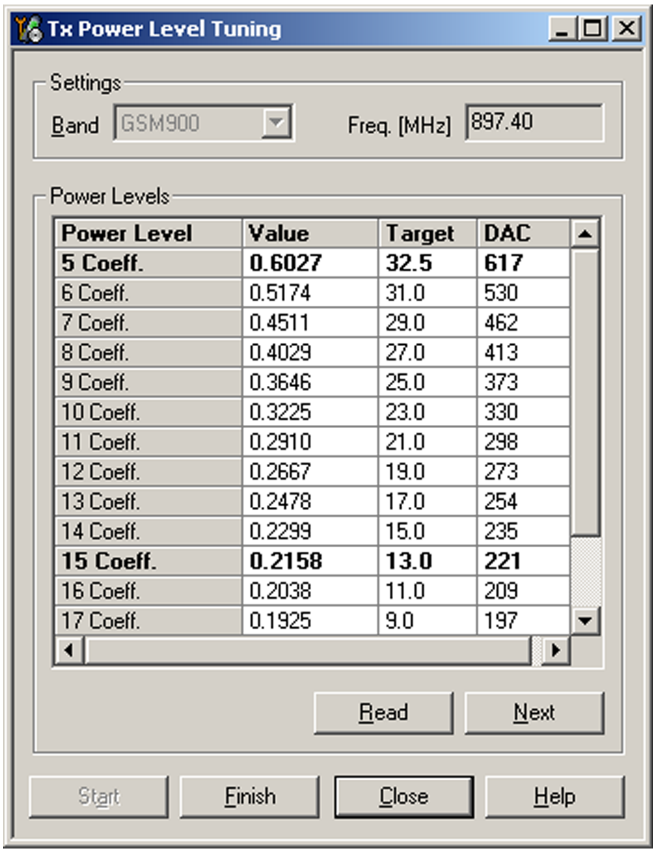
6. Set the spectrum analyzer for power level tuning:

Table 10 Spectrum analyzer settings: EDGE OFF tuning

Frequency	channel frequency (897.4MHz GSM900, 1747.8MHz GSM1800, 1880MHz GSM1900)
Span	200 kHz
Sweep time	3s
Trigger	Video triggering: Free run
Resolution BW	1 MHz
Video BW	3 kHz
Reference level offset	sum cable attenuation with module jig attenuation
Reference level	35dBm
Detector	Max Peak

A power meter with a peak power detector can be also used. Remember to take the attenuations into account!

7. Adjust power levels **5**, **15** and **19** to correspond the *Target dBm* column by pressing + or – keys.



Band: GSM900
Freq. [MHz]: 897.40

Power Level	Value	Target	DAC
5 Coeff.	**0.6027**	**32.5**	**617**
6 Coeff.	0.5174	31.0	530
7 Coeff.	0.4511	29.0	462
8 Coeff.	0.4029	27.0	413
9 Coeff.	0.3646	25.0	373
10 Coeff.	0.3225	23.0	330
11 Coeff.	0.2910	21.0	298
12 Coeff.	0.2667	19.0	273
13 Coeff.	0.2478	17.0	254
14 Coeff.	0.2299	15.0	235
15 Coeff.	**0.2158**	**13.0**	**221**
16 Coeff.	0.2038	11.0	209
17 Coeff.	0.1925	9.0	197

Check that the coefficient values are within the limits specified in the following table.

	Min	Typ	Max
GSM900 EDGE off			
PL5 coefficient	0.45	0.626	0.73
PL15 coefficient		0.234	
PL19 coefficient	0.12	0.195	0.3
GSM900 EDGE on			
PL8 coefficient	0.35	0.419	0.6
PL15 coefficient		0.247	
PL19 coefficient	0.12	0.204	0.3
GSM1800 EDGE off			
PL0 coefficient	0.45	0.51	0.7
PL11 coefficient		0.219	
PL15 coefficient	0.12	0.185	0.3
GSM1800 EDGE on			
PL2 coefficient	0.35	0.394	0.6
PL11 coefficient		0.23	
PL15 coefficient	0.12	0.194	0.3
GSM1900 EDGE off			
PL0 coefficient	0.45	0.482	0.7
PL11 coefficient		0.218	
PL15 coefficient	0.12	0.184	0.3
GSM1900 EDGE on			
PL2 coefficient	0.35	0.377	0.6
PL11 coefficient		0.23	
PL15 coefficient	0.12	0.193	0.3

8. If the values are within the limits, click **Next** to proceed to EDGE tuning.
9. Change video averaging to 50 in EDGE tuning if possible (remember to use spectrum analyzer's PEAK detector; some spectrum analyzers cannot use averaging when using PEAK detector).
10. Tune EDGE power levels to the corresponding target power levels.

    Only power levels **8**, **15** and **19** are tuned in GSM900, and **2**, **10** and **15** in GSM1800/1900.
11. Click **Next** to proceed to the next band.
12. When the tuning is completed, close the *Tx Power Level Tuning* window.

WCDMA receiver tunings

Rx AGC alignment and Rx band response calibration (WCDMA)

Context

Rx AGC alignment tuning is used to find out the real gain values of the WCDMA Rx AGC system and converters.

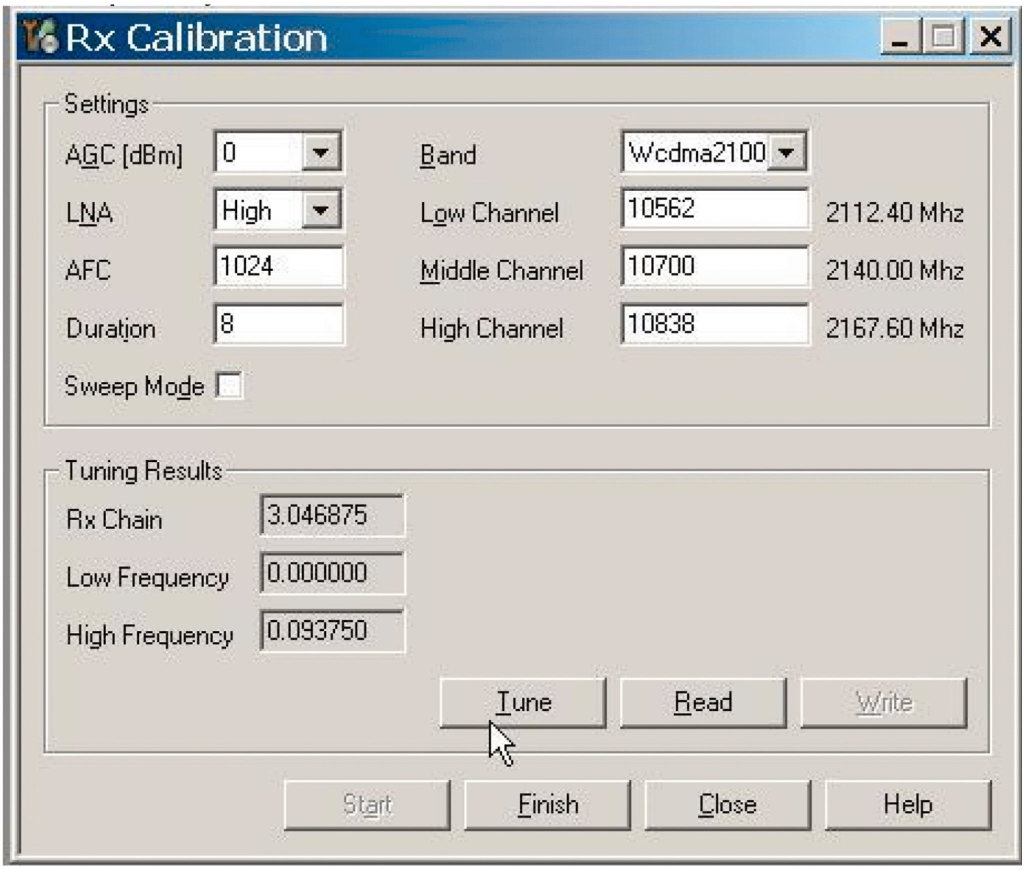
There is a band rejecting filter for each WCDMA Rx band between the front end LNA and the mixer of an RF ASIC. The amplitude ripple caused by this filter causes ripple to the RSSI measurement and therefore Rx band response calibration is needed.

The Rx band response calibration can be done in two different ways. If the signal generator used supports frequency sweep table, the calibration can be done as a part of the Rx calibration. If there is no support for the frequency sweep table , it is possible to calibrate all necessary frequencies one by one.

The first set of steps shows how to perform the calibration without the signal generator sweep feature. The alternative steps give instructions how to perform the calibration if the signal generator supports frequency sweeps, and the calibration can be performed within the Rx AGC calibration.

Steps

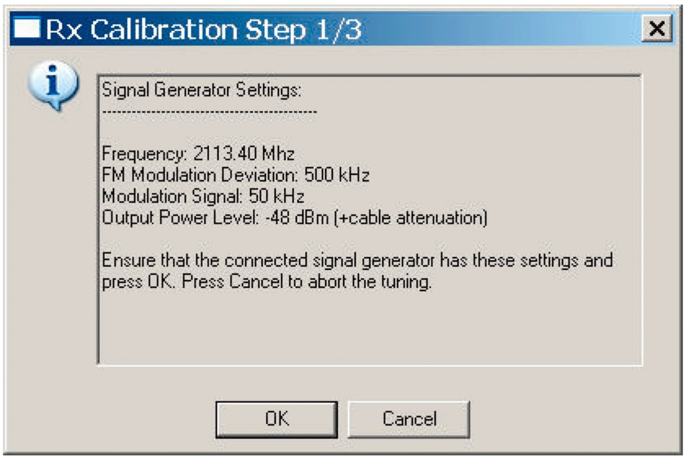
1. Connect the GSM connector of the module jig to a signal generator.
2. From the **Operating mode** drop-down menu, set mode to **Local**.
3. Choose **Tuning→WCDMA→Rx Calibration** .
4. Click **Start** and **Tune**.



AGC [dBm] 0
LNA High
AFC 1024
Duration 8
Sweep Mode ☐
Band Wcdma2100
Low Channel 10562 2112.40 Mhz
Middle Channel 10700 2140.00 Mhz
High Channel 10838 2167.60 Mhz

Rx Chain 3.046875
Low Frequency 0.000000
High Frequency 0.093750

5. Setup the signal generator to correspond the values in the *RX Calibration* pop-up window and click **OK**.

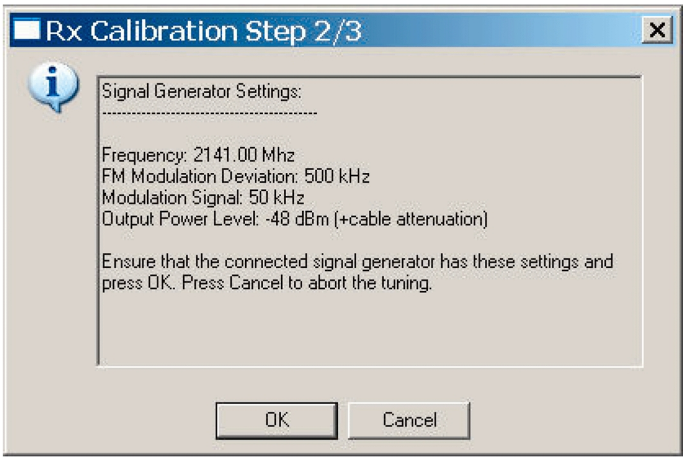


Signal Generator Settings:

Frequency: 2113.40 Mhz
FM Modulation Deviation: 500 kHz
Modulation Signal: 50 kHz
Output Power Level: -48 dBm (+cable attenuation)

Ensure that the connected signal generator has these settings and press OK. Press Cancel to abort the tuning.

6. Set the signal generator to correspond the values in the pop-up window and click **OK**.

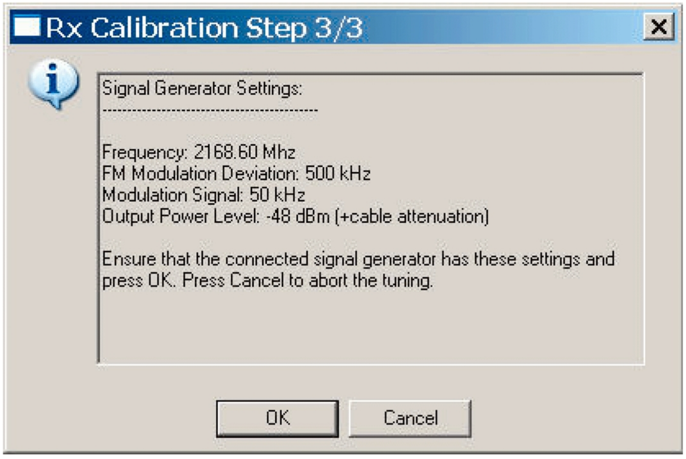


Signal Generator Settings:

Frequency: 2141.00 Mhz
FM Modulation Deviation: 500 kHz
Modulation Signal: 50 kHz
Output Power Level: -48 dBm (+cable attenuation)

Ensure that the connected signal generator has these settings and press OK. Press Cancel to abort the tuning.

7. Set the signal generator to correspond the values in the pop-up window and click **OK**.



Signal Generator Settings:

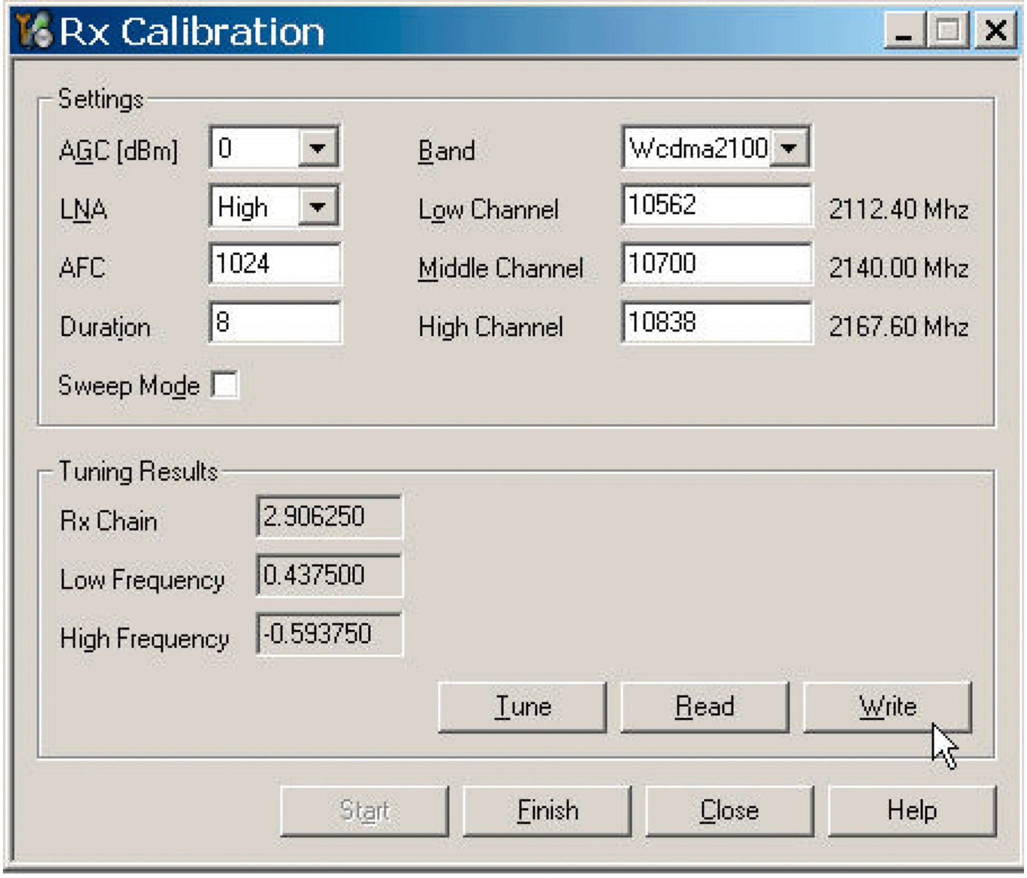
Frequency: 2168.60 Mhz
FM Modulation Deviation: 500 kHz
Modulation Signal: 50 kHz
Output Power Level: -48 dBm (+cable attenuation)

Ensure that the connected signal generator has these settings and press OK. Press Cancel to abort the tuning.

8. Check that the *Rx chain* value and *Band Response* values are is within the limits presented in the following table. Click **Write**.

	Min	Typ	Max	Unit
RX chain	-6	1.5... 3.5	6	dB

	Min	Typ	Max	Unit
Low freq	-5	-0.7... 4.0	5	
High freq	-5	-0.7... 4.0	5	


Rx Calibration
Settings
Tuning Results
Tune
Read
Write
Start
Finish
Close
Help

AGC [dBm]: 0
LNA: High
AFC: 1024
Duration: 8
Sweep Mode ☐
Band: Wcdma2100
Low Channel: 10562 2112.40 Mhz
Middle Channel: 10700 2140.00 Mhz
High Channel: 10838 2167.60 Mhz

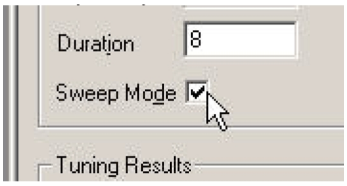
Rx Chain: 2.906250
Low Frequency: 0.437500
High Frequency: -0.593750

i If the Rx gain is acceptable, click **Yes** to save the results to the phone.

9. To close the *Rx Calibration* window, click **Close**.

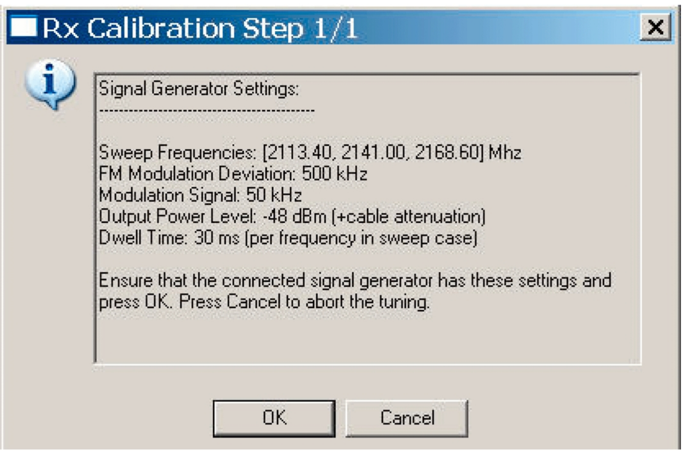
Alternative steps

- From the **Operating mode** drop-down menu, set mode to **Local**.
- Choose **Tuning→WCDMA→Rx Calibration.**
- Click **Start**.
- Check the **Sweep Mode** check box and click **Tune**.


Tuning Results

Duration: 8
Sweep Mode ☑

- Setup the signal generator according to the values in the pop-up window:

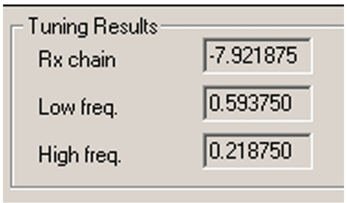


Signal Generator Settings:

Sweep Frequencies: [2113.40, 2141.00, 2168.60] Mhz
FM Modulation Deviation: 500 kHz
Modulation Signal: 50 kHz
Output Power Level: -48 dBm (+cable attenuation)
Dwell Time: 30 ms (per frequency in sweep case)

Ensure that the connected signal generator has these settings and press OK. Press Cancel to abort the tuning.

- Click **OK**.
- Check that the **Rx chain** , **Low freq.** and **High freq.** values in the *Tuning Results* window are within the limits presented in the following table.



Rx chain -7.921875
Low freq. 0.593750
High freq. 0.218750

	Min	Typ	Max	Unit
Rx chain	-6	1.5... 3.5	6	dB
Low freq	-5	-0.7...4.0	5	
High freq	-5	-0.7...4.0	5	

- If the Rx gain is acceptable, click **Yes** to save the results to the phone.
- To end the calibration, click **Close**.

WCDMA transmitter tunings

Tx AGC & power detector (WCDMA)

Context

Tx AGC & power detector tuning has two purposes:

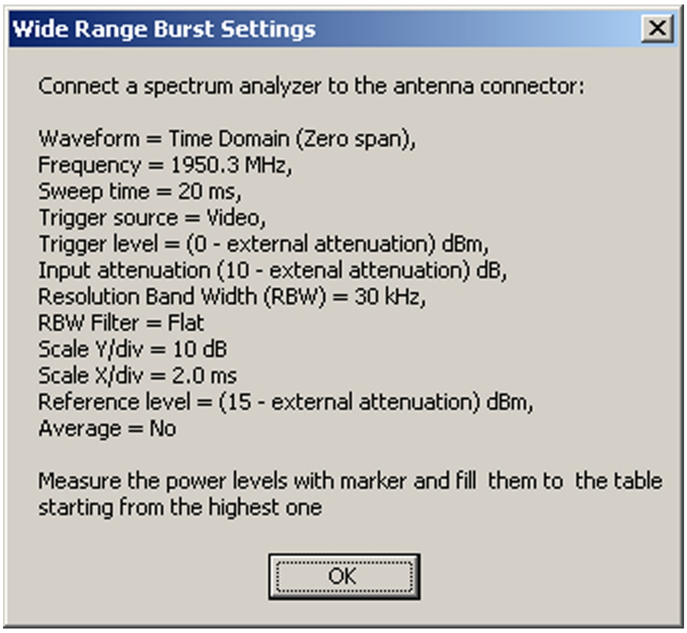
- to enable the phone to select the correct TxC value accurately in order to produce the required RF level
- to enable the phone to measure its own transmitter power accurately

There are two ways to perform the tuning. For an alternative method, see Alternative steps (page 7–41).

Steps

1. From the **Operating mode** drop-down menu, set mode to **Local**.
2. Choose **Tuning→WCDMA→Tx AGC & Power Detector.**
3. Click **Start**.
4. In the *Wide Range* pane, click **Tune** (the leftmost **Tune** button).

5. Set up the spectrum analyzer in the following way:



Wide Range Burst Settings

Connect a spectrum analyzer to the antenna connector:

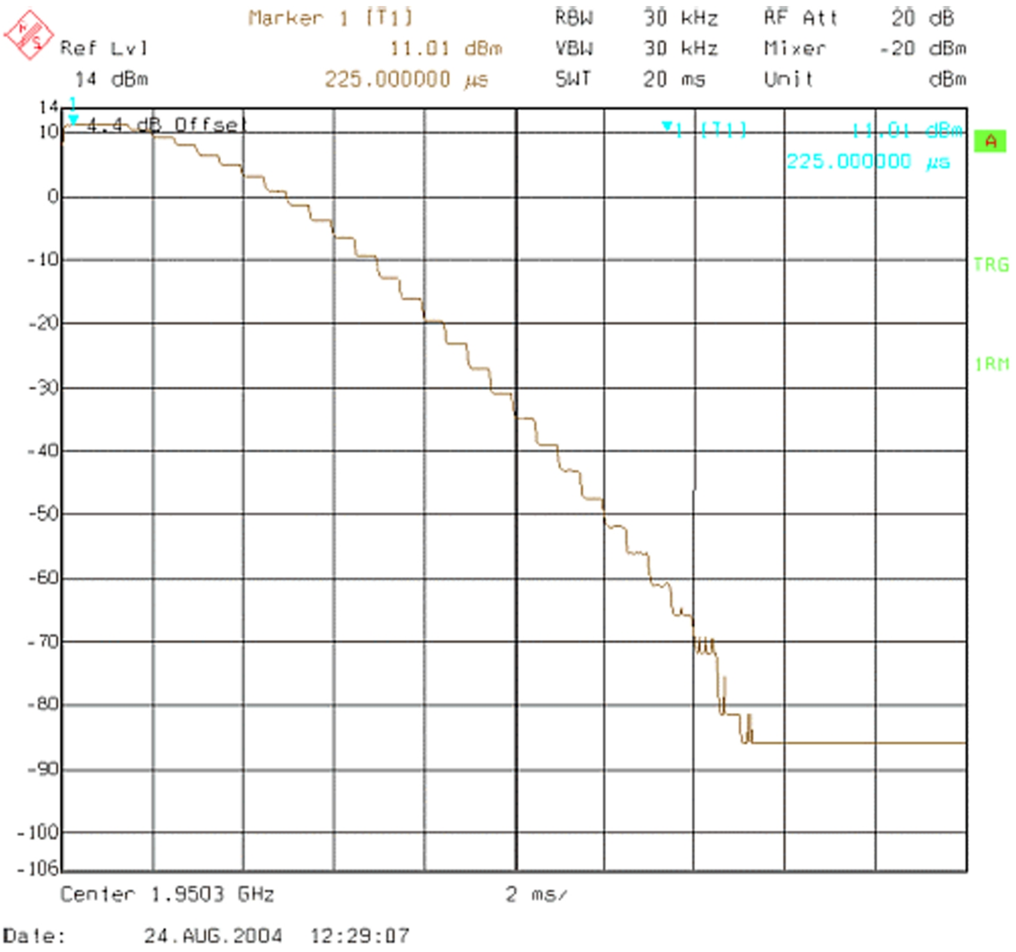
Waveform = Time Domain (Zero span),
Frequency = 1950.3 MHz,
Sweep time = 20 ms,
Trigger source = Video,
Trigger level = (0 - external attenuation) dBm,
Input attenuation (10 - extenal attenuation) dB,
Resolution Band Width (RBW) = 30 kHz,
RBW Filter = Flat
Scale Y/div = 10 dB
Scale X/div = 2.0 ms
Reference level = (15 - external attenuation) dBm,
Average = No

Measure the power levels with marker and fill them to the table starting from the highest one

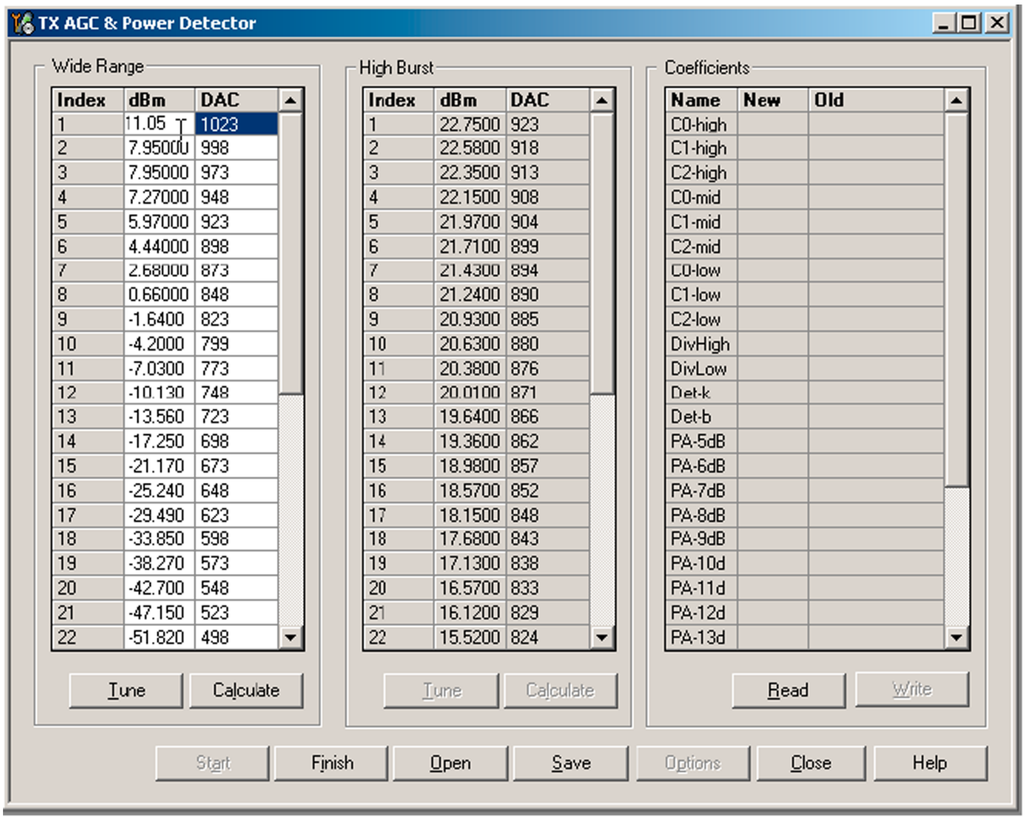
6. After setting the spectrum analyzer, click **OK**.
7. Measure the power levels with a marker.

   Take the first measurement from 250 us after the trigger, the second from 750 us, the third on 1220 us and so on in every 500 us until the table is filled.

   > **Note:** It must be possible to measure power levels down to –68 dBm. The measured power levels must be monotonously decreasing.
   >
   > Make sure that the marker is not measuring the level of noise spike on lower levels.


Marker 1 [T1]
Ref Lvl
14 dBm
11.01 dBm
225.000000 µs
RBW 30 kHz
VBW 30 kHz
SWT 20 ms
RF Att 20 dB
Mixer -20 dBm
Unit dBm
4.4 dB Offset
1 [T1] 11.01 dBm
225.000000 µs
A
TRG
1RM
14
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-106
Center 1.9503 GHz
2 ms/
Date: 24.AUG.2004 12:29:07

8. Fill in the power level values (in dBm) to the *Wide Range* table.


TX AGC & Power Detector
Wide Range
High Burst
Coefficients
Tune
Calculate
Tune
Calculate
Read
Write
Start
Finish
Open
Save
Options
Close
Help

Wide Range

Index	dBm	DAC
1	11.05	1023
2	7.95000	998
3	7.95000	973
4	7.27000	948
5	5.97000	923
6	4.44000	898
7	2.68000	873
8	0.66000	848
9	-1.6400	823
10	-4.2000	799
11	-7.0300	773
12	-10.130	748
13	-13.560	723
14	-17.250	698
15	-21.170	673
16	-25.240	648
17	-29.490	623
18	-33.850	598
19	-38.270	573
20	-42.700	548
21	-47.150	523
22	-51.820	498

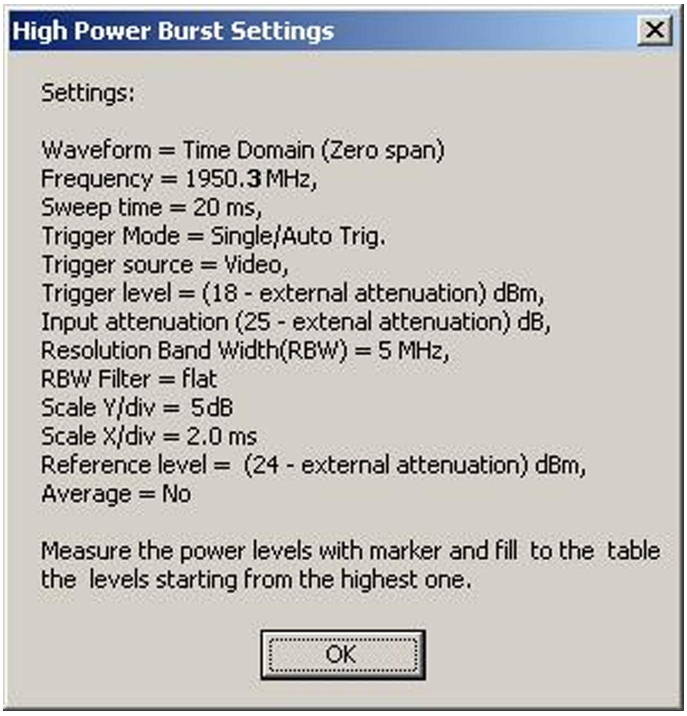
High Burst

Index	dBm	DAC
1	22.7500	923
2	22.5800	918
3	22.3500	913
4	22.1500	908
5	21.9700	904
6	21.7100	899
7	21.4300	894
8	21.2400	890
9	20.9300	885
10	20.6300	880
11	20.3800	876
12	20.0100	871
13	19.6400	866
14	19.3600	862
15	18.9800	857
16	18.5700	852
17	18.1500	848
18	17.6800	843
19	17.1300	838
20	16.5700	833
21	16.1200	829
22	15.5200	824

Coefficients

Name	New	Old
C0-high		
C1-high		
C2-high		
C0-mid		
C1-mid		
C2-mid		
C0-low		
C1-low		
C2-low		
DivHigh		
DivLow		
Det-k		
Det-b		
PA-5dB		
PA-6dB		
PA-7dB		
PA-8dB		
PA-9dB		
PA-10d		
PA-11d		
PA-12d		
PA-13d		

9. In the *Wide Range* pane, click **Calculate**.
10. In the *High Burst* pane, click **Tune**.
11. Adjust the spectrum analyzer according to the following settings:


High Power Burst Settings
OK

Settings:

Waveform = Time Domain (Zero span)
Frequency = 1950.3 MHz,
Sweep time = 20 ms,
Trigger Mode = Single/Auto Trig.
Trigger source = Video,
Trigger level = (18 - external attenuation) dBm,
Input attenuation (25 - extenal attenuation) dB,
Resolution Band Width(RBW) = 5 MHz,
RBW Filter = flat
Scale Y/div = 5dB
Scale X/div = 2.0 ms
Reference level = (24 - external attenuation) dBm,
Average = No

Measure the power levels with marker and fill to the table the levels starting from the highest one.

12. Measure the power levels with a marker.

    Take the first measurement from 250 us after the trigger, the second from 750 us, third on 1220 us and so on in every 500 us until the table is filled.

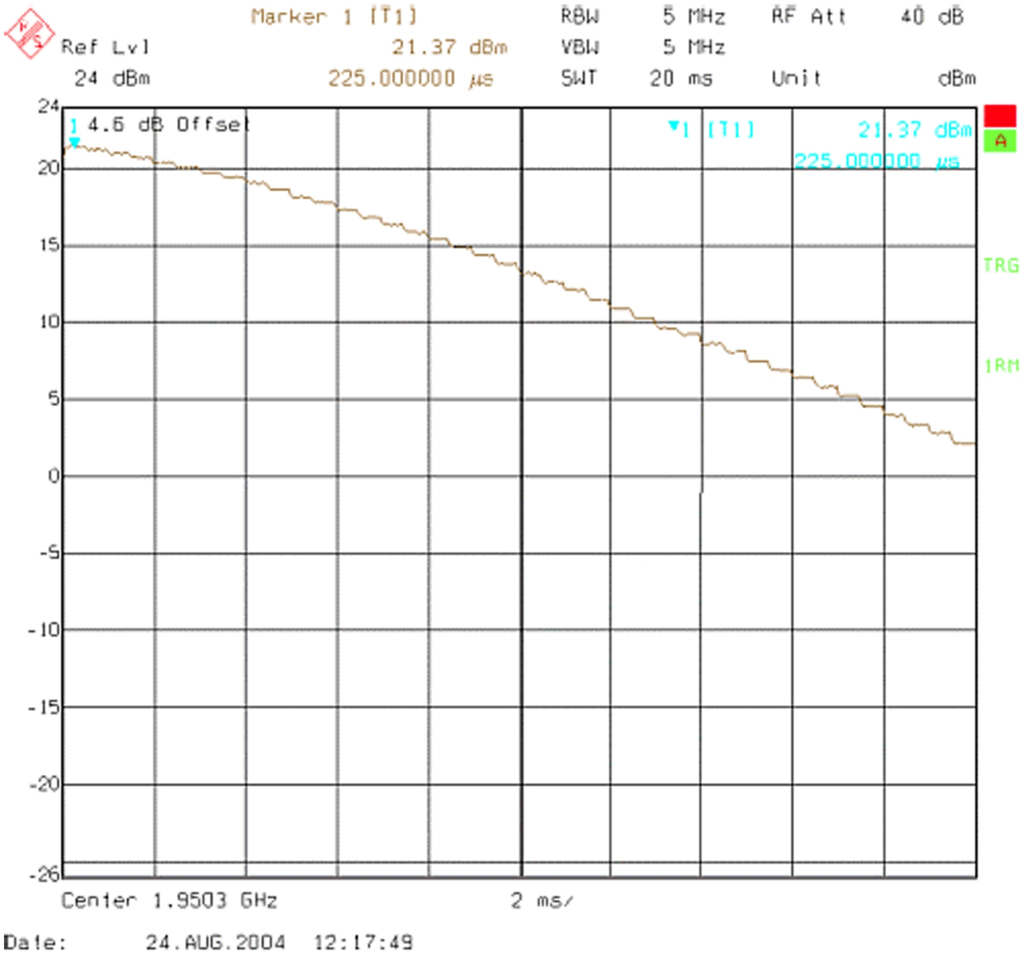


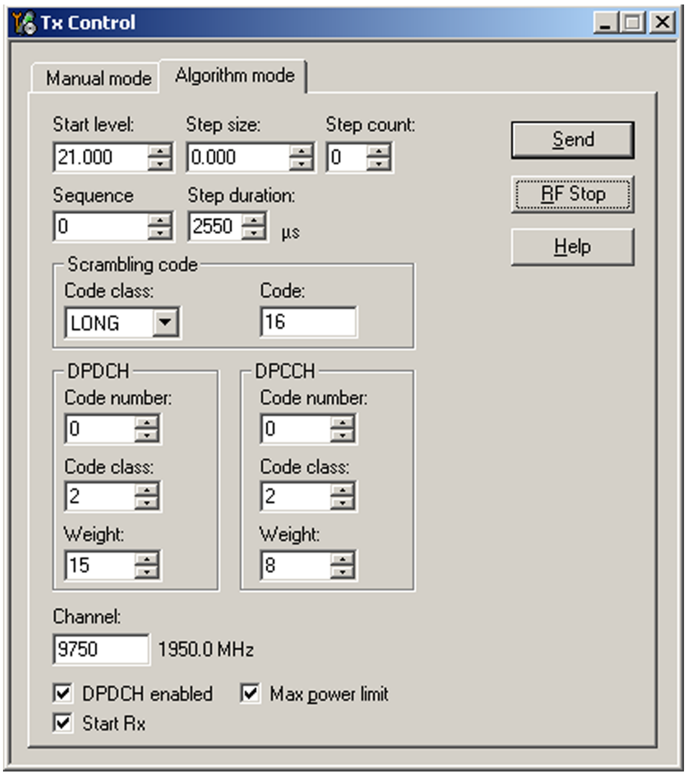
Figure 65 High burst measurement

13. In the *High Burst* pane, click **Calculate**.
14. Check that the calculated values are within the limits specified in the following table:

	Min	Max
C0-high	-0.5	5
C1-high	-50	50
C2-high	400	900
C0-mid	-0.7	0.7
C1-mid	0	50
C2-mid	400	900
C0-low	-4	4
C1-low	-400	440
C2-low	-10000	15000

	Min	Max
Det-k	100	220
Det-b	0	150

15. To save the coefficients to the phone, click **Write**.
16. To close the *Tx AGC & Power Detector* window, click **Close**.
17. Choose **Testing→WCDMA→ Tx Control.**
18. Select the *Algorithm* mode tab.



Start level: 21.000
Step size: 0.000
Step count: 0
Sequence: 0
Step duration: 2550 µs

Scrambling code
Code class: LONG
Code: 16

DPDCH
Code number: 0
Code class: 2
Weight: 15

DPCCH
Code number: 0
Code class: 2
Weight: 8

Channel: 9750 1950.0 MHz

☑ DPDCH enabled ☑ Max power limit
☑ Start Rx

19. Write the target power level 25 dBm to the *Start level* line and check the **Max power limit** check box (detector calibration check).
20. Setup the spectrum analyzer with the following settings:

Center frequency:	**1950.3 MHz**
Span:	0 Hz
Reference level offset:	Cable attenuations + adapter attenuation
Reference level:	**24 dBm or -20 dBm depending on the level measured**
Input attenuation:	Automatic
Resolution bandwidth:	5 MHz
Video bandwidth:	5 MHz
Sweep time:	20 ms
Detector:	**RMS detector**

Average:	No
Trigger:	Free run

21. Click **Send**.
22. Measure the WCDMA output power.

    It should be around 21 dBm.
23. Click **RF Stop** and uncheck the **Max power limit** check box.
24. Repeat steps **19** to **23** for levels +19, +7, 0, -20 and –40 dBm.

    The measured output power may not differ more than +-2 dB from the requested value at level +19 dBm and no more than +-4 dB on lower levels.

    Remember to stop the RF before sending new data.

Alternative steps

- Measure the wide range levels normally and write down the levels that are possible to measure.
- Click **Finish**.
- Click **Options**.
- Change the first wide range DAC value to *573* and change the number of tuning steps to *21*.
- Change the spectrum analyzer reference level to *–20* dBm and adjust the input attenuator to the lowest value possible.
- In the *Wide Range* pane, click **Tune** and fill in the rest of values starting from the 19th level.

Tx band response calibration (WCDMA)

Context

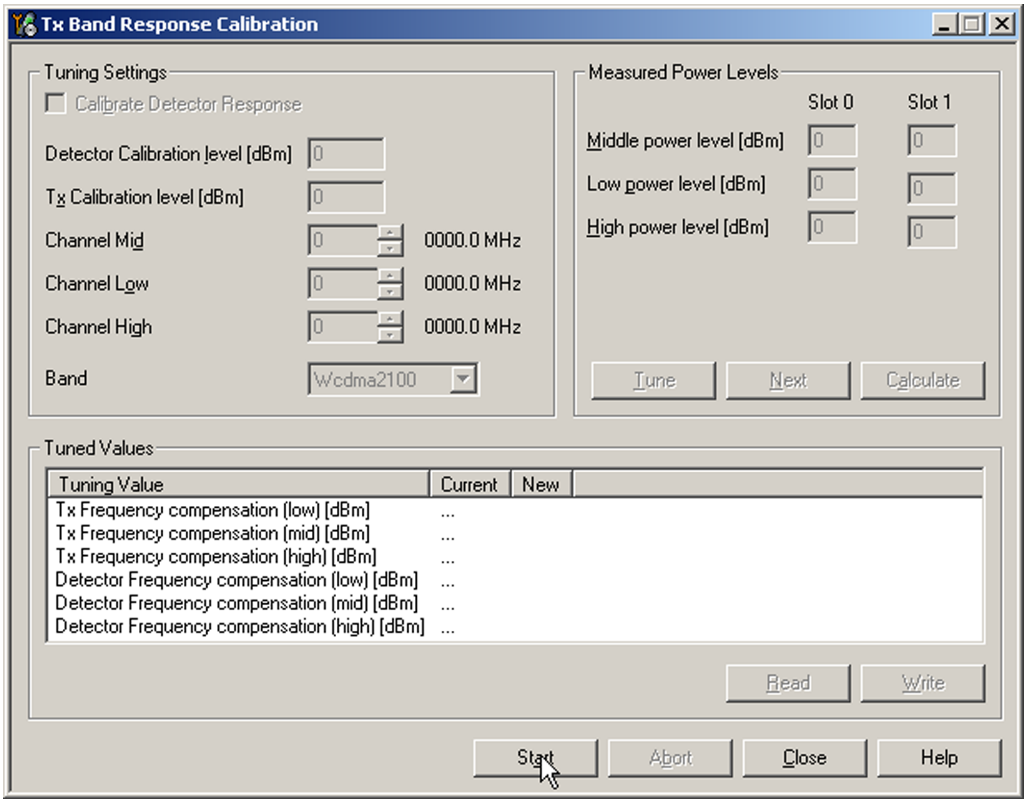
The purpose of this tuning operation is to calibrate the WCDMA Tx performance. It defines the power detector and Tx frequency compensation values. However, before starting this tuning procedure, it is necessary to carry out Tx AGC & Power Detector Calibration tuning. This is because its results will be needed for this tuning operation.

- In the *Tuning Settings* pane, it is possible to edit the numbers of channels used in this tuning operation.
- If the **Calibrate Detector Response** check box is checked, only Tx response is calibrated. Zero is written to the power detector compensation values block in the permanent memory (PM) of the terminal.
- **Detector Calibration level** shows the power level used for calibrating the power detector in this tuning procedure.
- **Tx Calibration level** shows the power level used for calibrating tx frequency in this tuning procedure.
- In *Measured Power Levels* pane, you can insert the dBm values read from the power meter.
- In *Tuned Values* pane, the values that are stored in the permanent memory (PM) of the terminal in Current columns are shown.
- New values are added to *New* column when the **Calculate** button is clicked.
- **Abort** button aborts the tuning operation without saving the tuned values.
- **Read** button reads the tuned values in the PM of the terminal, and displays them in the *Tuned Values* pane in in the *Current* column.

Steps

1. Start *Phoenix* service software.
2. Choose **File→Scan Product** .

3. From the **Operating mode** drop-down menu, set mode to **Local**.
4. Choose **Tuning→WCDMA→Tx Band Response Calibration** .
5. Click **Start**.


Tx Band Response Calibration
Tuning Settings
☐ Calibrate Detector Response
Measured Power Levels
Slot 0
Slot 1
Tuned Values
Tune
Next
Calculate
Read
Write
Start
Abort
Close
Help

Detector Calibration level [dBm]: 0
Tx Calibration level [dBm]: 0
Channel Mid: 0 — 0000.0 MHz
Channel Low: 0 — 0000.0 MHz
Channel High: 0 — 0000.0 MHz
Band: Wcdma2100

	Slot 0	Slot 1
Middle power level [dBm]	0	0
Low power level [dBm]	0	0
High power level [dBm]	0	0

Tuning Value	Current	New
Tx Frequency compensation (low) [dBm]	...	
Tx Frequency compensation (mid) [dBm]	...	
Tx Frequency compensation (high) [dBm]	...	
Detector Frequency compensation (low) [dBm]	...	
Detector Frequency compensation (mid) [dBm]	...	
Detector Frequency compensation (high) [dBm]	...	

The current values are shown in the *Tuned Values* pane.

6. Click **Tune**.
7. Connect the power meter to the terminal, and set it to **Channel Mid** frequency.
8. Read the values of slot 0 and slot 1 from the power meter and enter them to **Middle power level** fields in the **Measured Power Levels** pane.

   Slot 0 is used for detector calibration and slot 1 for Tx calibration.
9. Click **Next**.
10. Switch the power meter to **Channel Low** frequency.
11. Read the values from the power meter, and enter them to **Low power level** fields.
12. Switch the power meter to **Channel High** frequency.
13. Read the values from the power meter, and enter them to **High power level** fields.
14. Click **Next**.
15. Click **Calculate**.

    The tuned values are shown in the *Tuned Values* pane in the *New* column.
16. Check that the tuned values are within the limits presented in the following table. If they are OK, click **Yes**.

	Min	Max
Tx Freq Comp (the first and last value)	-4	+4

17. To save the tuned values to the terminal, click **Write**.
18. Close the *Tx Band Response Calibration* window.

Tx LO leakage (WCDMA)

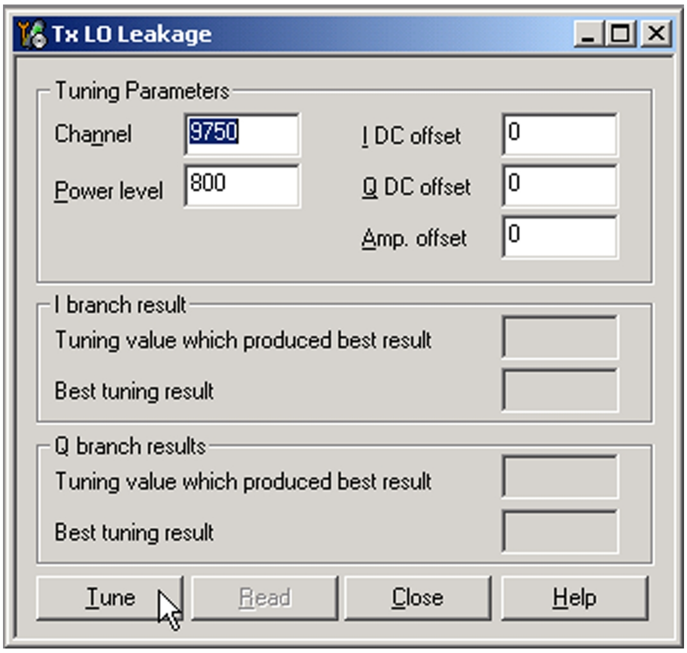
Context

The purpose of Tx LO leakage tuning is to minimize the carrier leakage of the IQ-modulator which is caused by the DC offset voltages in the Tx IQ-signal lines and in the actual IQ modulator.

The tuning improves WCDMA Tx AGC dynamics at low power levels. A self-calibration routine selects the best combination for internal control words in order to produce minimum LO leakage.

Steps

1. From the **Operating mode** drop-down menu, set mode to **Local**.
2. Choose **Tuning→WCDMA→ Tx LO Leakage** .
3. Click **Tune**.


Tx LO Leakage
Tuning Parameters
I branch result
Tuning value which produced best result
Best tuning result
Q branch results
Tuning value which produced best result
Best tuning result
Tune
Read
Close
Help

Channel 9750
Power level 800
I DC offset 0
Q DC offset 0
Amp. offset 0

4. To end the tuning, click **Close**.

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8 — System Module

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Baseband description

System module block diagram

The device consists of two different main modules: transceiver (1jq) and UI (1ke). The transceiver board consists of baseband and RF components

The UI board consists of key domes and keypad backlights. Connection between the UI and the transceiver board is established via a board-to-board spring connector.

Note: In this description, user interface HW covers display, keyboard, keyboard backlight and ALS.

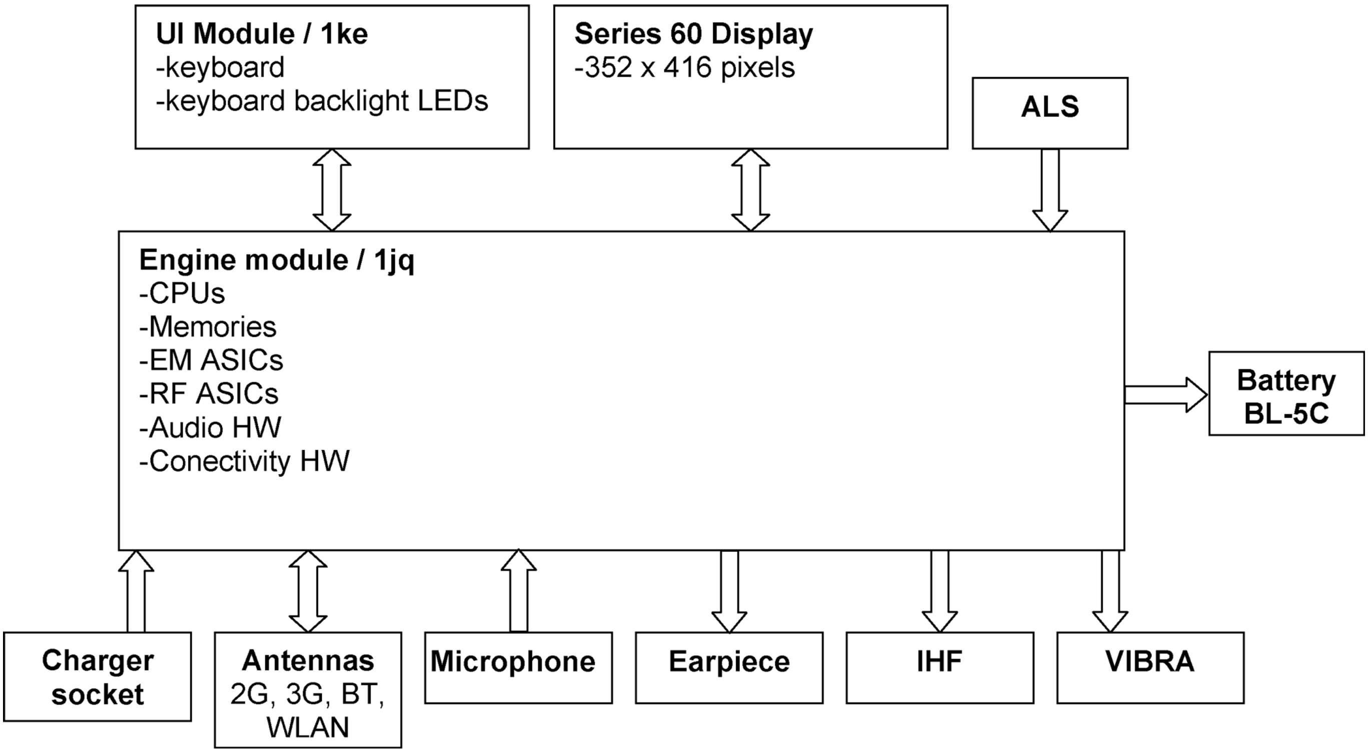

UI Module / 1ke
-keyboard
-keyboard backlight LEDs
Series 60 Display
-352 x 416 pixels
ALS
Engine module / 1jq
-CPUs
-Memories
-EM ASICs
-RF ASICs
-Audio HW
-Conectivity HW
Battery
BL-5C
Charger socket
Antennas 2G, 3G, BT, WLAN
Microphone
Earpiece
IHF
VIBRA

Figure 66 System level block diagram

Baseband functional description

Digital baseband consists of ISA based modem and SYMBIAN based application sections. Modem functionality is in RAP and application processor acts as a platform for SYMBIAN applications.

Modem section consists of RAP ASIC with NOR FLASH and SDRAM memory as the core. RAP supports cellular protocols of WCDMA (3GPP Release 4) and GSM (minimum EDGE class 10). Modem section has 64Mbits of SDRAM and 64Mbits of NOR flash memory. RAP operates with the system clock of 38.4 MHz, which comes from the VCTCXO.

Application section includes the application processor with DDR/NAND combo memory as the core. Stacked DDR/NAND application memory has 512Mbits of DDR memory and 1G of flash memory. The application processor uses 19.2MHz clock, which comes from the RAP divided by two from the 38.4 MHz system clock.

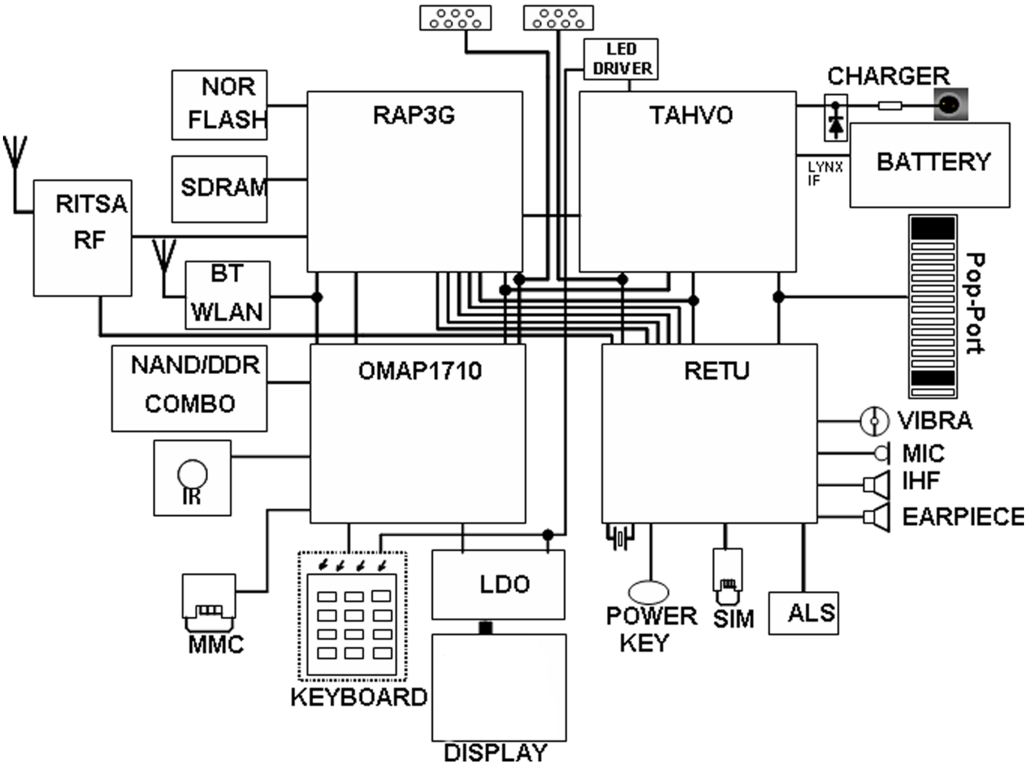

NOR
FLASH
SDRAM
RITSA
RF
BT
WLAN
RAP3G
LED
DRIVER
TAHVO
CHARGER
BATTERY
LYNX
IF
Pop-Port
NAND/DDR
COMBO
OMAP1710
RETU
IR
VIBRA
MIC
IHF
EARPIECE
MMC
KEYBOARD
LDO
DISPLAY
POWER
KEY
SIM
ALS

Figure 67 Functional block diagram

The application processor takes care of processing application SW and handles the UI SW. It consists of OMAP3.3 and peripheral subsystems like display- and keyboard driver blocks.

Absolute maximum ratings

Signal	Min	Nom	Max	Unit	Notes
Battery voltage (idle)	-0.3		+4.5	V	Battery voltage maximum value is specified during charging is active
Battery voltage (Call)	+3.2		+4.3	V	Battery voltage maximum value is specified during charging is active
Charger input voltage	-0.3		+20	V	
Back-Up supply voltage	0	2.5	2.6	V	Maximum capacity of the backup power supply assumed to be 10 µAh.

Phone modes of operation

Mode	Description
NO_SUPPLY	(dead) mode means that the main battery is not present or its voltage is too low (below N2200 master reset threshold) and that the back-up battery voltage is too low.
BACK_UP	The main battery is not present or its voltage is too low but back-up battery voltage is adequate and the 32 kHz oscillator is running (RTC is on).

Mode	Description
PWR_OFF	In this mode (warm), the main battery is present and its voltage is over N2200 master reset threshold. All regulators are disabled, PurX is on low state, the RTC is on and the oscillator is on. PWR_OFF (cold) mode is almost the same as PWR_OFF (warm), but the RTC and the oscillator are off.
RESET	RESET mode is a synonym for start-up sequence. In this mode certain regulators are enabled and after they and RFClk have stabilized, the system reset (PurX) is released and PWR_ON mode entered. RESET mode uses 32 kHz clock to count the REST mode delay (typically 16 ms).
SLEEP	SLEEP mode is entered only from PWR_ON mode with the aid of SW when the system's activity is low. There are in principle three different sleep modes: • Application processor sleep • RAP sleep • Application processor and RAP sleep (deep sleep)
FLASHING	FLASHING mode is for SW downloading.

Voltage limits

Parameter	Description	Value
VMSTR	Master reset threshold (N2200)	2.2V (typ.)
VMSTR+	Master reset threshold level, rising (N2300)	2.1V (typ.)
VMSTR-	Master reset threshold level, falling (N2300)	1.9V (typ.)
VCOFF+	Hardware cutoff (rising)	2.9V (typ.)
VCOFF-	Hardware cutoff (falling)	2.6V (typ.)
SWCOFF	SW cutoff limit	~3.2V

The master reset threshold controls the internal reset of N2200 / (N2300). If battery voltage is above VMSTR, N2300's charging control logic is alive. Also, RTC is active and supplied from the main battery. Above VMSTR, N2300 allows the system to be powered on although this may not succeed due to voltage drops during start up. SW can also consider battery voltage too low for operation and power down the system.

Power key

The system boots up when power key is pressed (adequate battery voltage, VBAT, present).

Power down can be initiated by pressing the power key again (the system is powered down with the aid of SW). Power on key is connected to N2200 ASIC via PWRONX signal.

Power distribution

Power supply components:

- EM ASIC N2200
- EM ASIC N2300
- application processor VCORE SMPS
- BT

- WLAN
- LDO
- discrete regulators
- backlight SMPS

All the above are powered by the main battery voltage.

Battery voltage is also used on the RF side for power amplifiers (GSM PA & WCDMA PA) and for Rx/Tx ASICs.

Discrete power supplies are used to generate 2.8V to BT/WLAN oscillator, 1.5V for the LCD controller voltage, 1.05V/1.4V for application processor and 18V for the backlight LEDs.

The device supports both 1.8V/3V SIM cards which are powered by EM ASIC N2200 / VSIM1. EM ASIC N2200s VSIM2 is used to power RS MMC 1.8V only. USB accessories which needs power from the device are powered by EM ASIC N2300 / VOUT.

External SMPS is used to drive LEDs, SMPS is controlled by EM ASIC N2300 and powered by battery voltage.

System power-up

After inserting the main battery, regulators started by HW are enabled. SW checks, if there is some reason to keep the power on. If not, the system is set to power off state by watchdog. Power up can be caused by the following reasons:

- Power key is pressed
- Charger is connected
- RTC alarm occurs
- MBUS wake-up

Clocking scheme

Two main clocks are provided to the system: 38.4MHz RF clock produced by VCTCXO in RF section and 32.768kHz sleep clock produced by EM ASIC (N2200) with an external crystal.

RF clock is generated only when VCTCXO is powered on by EM ASIC (N2200) regulator. Regulator itself is activated by SleepX signals from both RAP and application processor. When both CPUs are on sleep, RF clock is stopped.

RF clock is used by RAP that then provides (divided) 19.2MHz SysClk further to OMAP. Both RAPG and application processor have internal PLLs which then create clock signals for other peripheral devices/interfaces like RS MMC, SIM, CCP, I2C and memories.

32k Sleep Clock is always powered on after startup. Sleep clock is used by RAP and OMAP for low-power operation.

SMPS Clk is 2.4MHz clock line from RAP to EM ASIC (N2300) used for switch mode regulator synchronizing in active mode. In deep sleep mode, when VCTCXO is off, this signal is set to '0'-state.

BT Clk is a 38.4MHz clock. BT ASIC BRF6150 requires a system clock which it uses to derive all its internal timing. The external TCXO clock oscillator is used for the system clock with a sinusoidal output.

CLK600 is 600KHz signal from EM ASIC (N2300) to APE VCORE SMPS. The clock source is internal RC oscillator in EM ASIC (N2300) (during the power-up sequence and sleep) or RAP SMPS Clk divided by 4 after the power-up sequence.

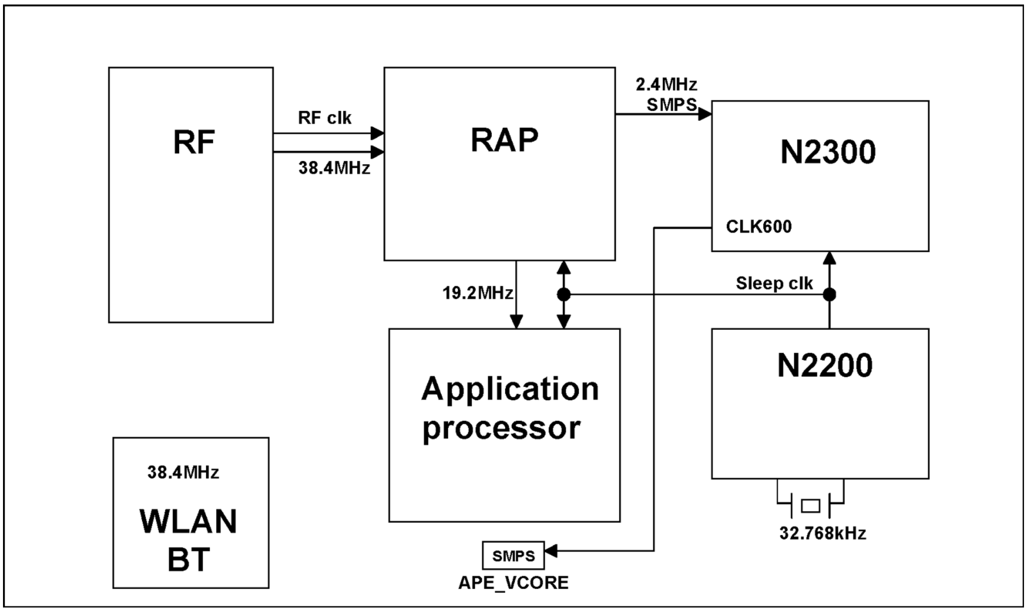


Figure 68 Clocking scheme

Bluetooth

The device Bluetooth is based on BRF6150-ROM ASIC which is a low power Bluetooth RF-tranceiver module and has the BTH/WLAN physical coexistence interface. BRF6150-ROM is a single chip Bluetooth device appropriate for use in applications, where the BB acts as a Bluetooth host interface. The host device (phone) provides powering for the integrated Bluetooth and WLAN system and a separate clock request is used for BTH and WLAN by an external TCXO reference clock 38.4 MHz.

Bluetooth device provides a fully digital link for communication between a master unit and one or max seven slave units. Data rate is regulated between the master and the slave.

The UART interface handles the transfer of control and data information between application processor and the BT system.

The PCM interface is used for audio data transfer between RAP and the BT system (BC4).

USB

USB (Universal Serial Bus) provides a wired connectivity between a USB host PC and peripheral devices.

USB is a differential serial bus for USB devices. USB controller supports USB specification revision 2.0 with full speed USB (12 Mbps). The device is connected to the USB host through the system connector. The USB bus is hot plugged capable, which means that USB devices may be plugged in/out at any time.

WLAN

STLC4370A implements 802.11b/g WLAN radio for embedded, low-power and small form factor mobile applications.

STLC4370A has a fully integrated radio chip including a direct-conversion transceiver, RF synthesizer and VCO, and high-speed data converters.

The baseband chip implements OFDM/CCK digital baseband processor and ARM9- based MAC with internal SRAM memories.

The energy management unit integrates required power management functions to operate the system from VBAT (3.0 – 5.5 V). The EM unit generates 1.2 V digital core voltage, two 1.8 V supplies for RF and 2.8 V LDO for PA bias supply.

Low-power sleep mode operation is enabled by low-speed 32 kHz clock (32768 Hz) and energy management unit low-current stand-by mode.

RFMD RF5191 power amplifier implements amplification of the transmit signal to required power levels. RF5191 amplifier is connected to VBAT.

The PA includes power detector for closed-loop power control purposes. Other parts in discrete front-end include RF switches, baluns and band filters.

The transmitter section of WLAN module contains integrated baseband filter, mixer and a driver amplifier with a variable output power.

The RF signal of WLAN module is filtered before PA. The signal goes after the (PA and TX/RX/Bluetooth switches) to the RF bandpass filter.

The receiver is a direct conversion receiver. The received input signal is filtered with a ceramic bandpass filter after which the TX/RX switch selects the receiver branch.

A balun before WLAN module transforms the single-ended signal to the balanced type. The IQ-modulator down converts the signal into I and Q signals.

The channel filtering is performed with a low pass filter. The reference signal (38,4MHz) from the TCXO is input to the WLAN module circuit (synthesizer). The RF oscillator core is running at double frequency, 5GHz. A desired TX frequency of 2.4 GHz is generated by decreasing LO frequency by half.

Table 11 General RF specifications

Parameter	Value
Supported channels	2412 - 2462 MHz (US bands)
	2412 - 2472 MHz (EU bands)
Transmitter Power (max)	
Barker/CCK (1, 2, 5.5, 11 Mb/s)	17dBm
OFDM-BPSK(6, 9 Mb/s)	15dBm
OFDM-QPSK(12,18 Mb/s)	15dBm
OFDM-16QAM (24, 36 Mb/s)	13dBm
OFDM-64QAM (48,54 Mb/s)	13dBm
Power control range	0 17 dBm
Receiver sensitivity (typical) 11M/bits. 1024 bytes / 8% PER	-84dBm

STLC4370A includes energy management IC that generates the required from the battery voltage VBAT. The management unit has the following features:

- Four LDOs: 2 × 1.8 V, 2.8 V, 1.2 V
- Stepdown (disabled in STLC4370A)
- Stand-by mode for reduced quiescent current
- Power ON/OFF management
- Level-shifting for RF switches
- Thermal shutdown

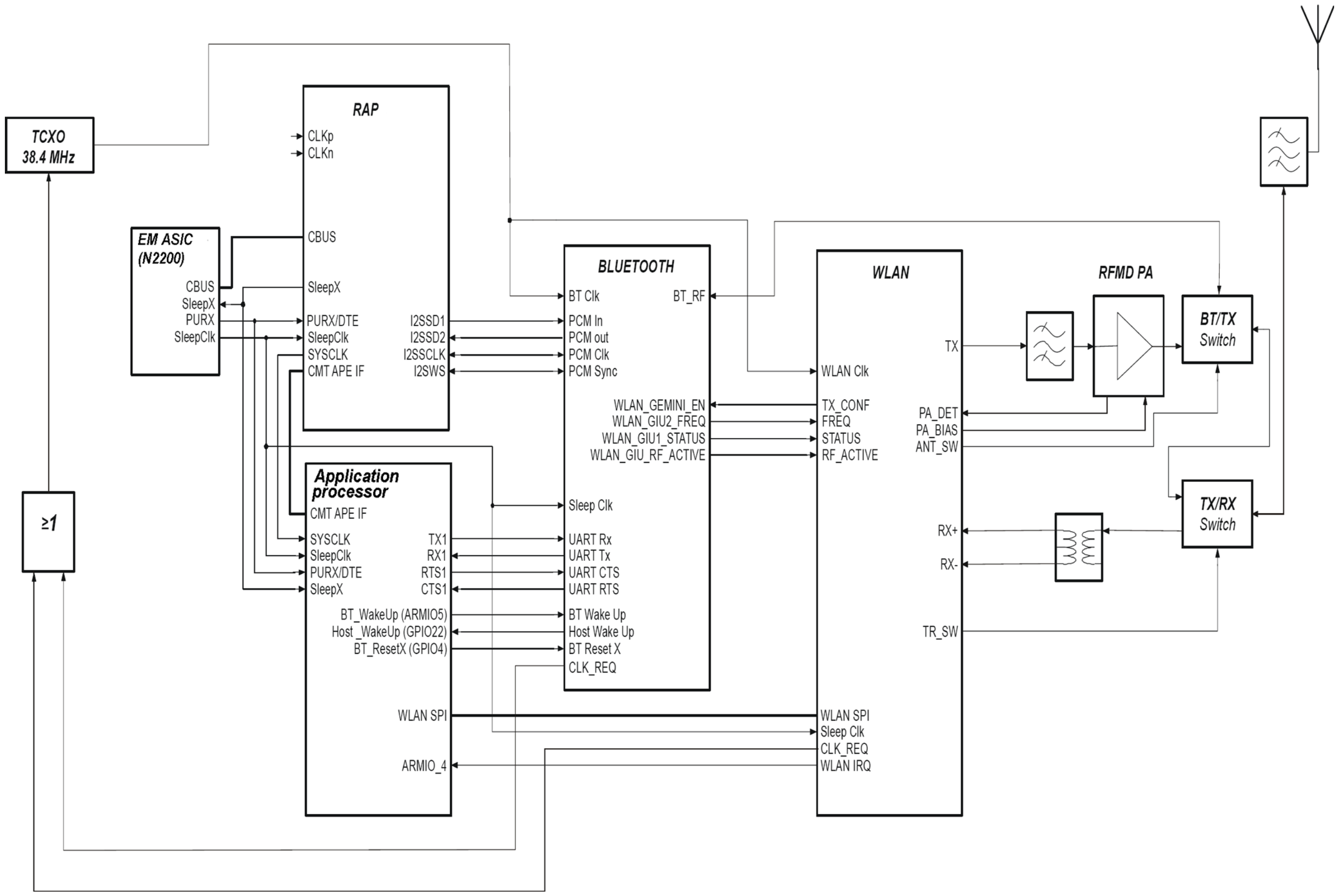

TCXO
38.4 MHz
RAP
CLKp
CLKn
CBUS
SleepX
PURX/DTE
SleepClk
SYSCLK
CMT APE IF
I2SSD1
I2SSD2
I2SSCLK
I2SWS
EM ASIC
(N2200)
CBUS
SleepX
PURX
SleepClk
BLUETOOTH
BT Clk
BT_RF
PCM In
PCM out
PCM Clk
PCM Sync
WLAN_GEMINI_EN
WLAN_GIU2_FREQ
WLAN_GIU1_STATUS
WLAN_GIU_RF_ACTIVE
Sleep Clk
UART Rx
UART Tx
UART CTS
UART RTS
BT Wake Up
Host Wake Up
BT Reset X
CLK_REQ
Application processor
CMT APE IF
SYSCLK
SleepClk
PURX/DTE
SleepX
TX1
RX1
RTS1
CTS1
BT_WakeUp (ARMIO5)
Host _WakeUp (GPIO22)
BT_ResetX (GPIO4)
WLAN SPI
ARMIO_4
≥1
WLAN
WLAN Clk
TX_CONF
FREQ
STATUS
RF_ACTIVE
TX
PA_DET
PA_BIAS
ANT_SW
RX+
RX-
TR_SW
WLAN SPI
Sleep Clk
CLK_REQ
WLAN IRQ
RFMD PA
BT/TX
Switch
TX/RX
Switch

Figure 69 WLAN and BT block diagram

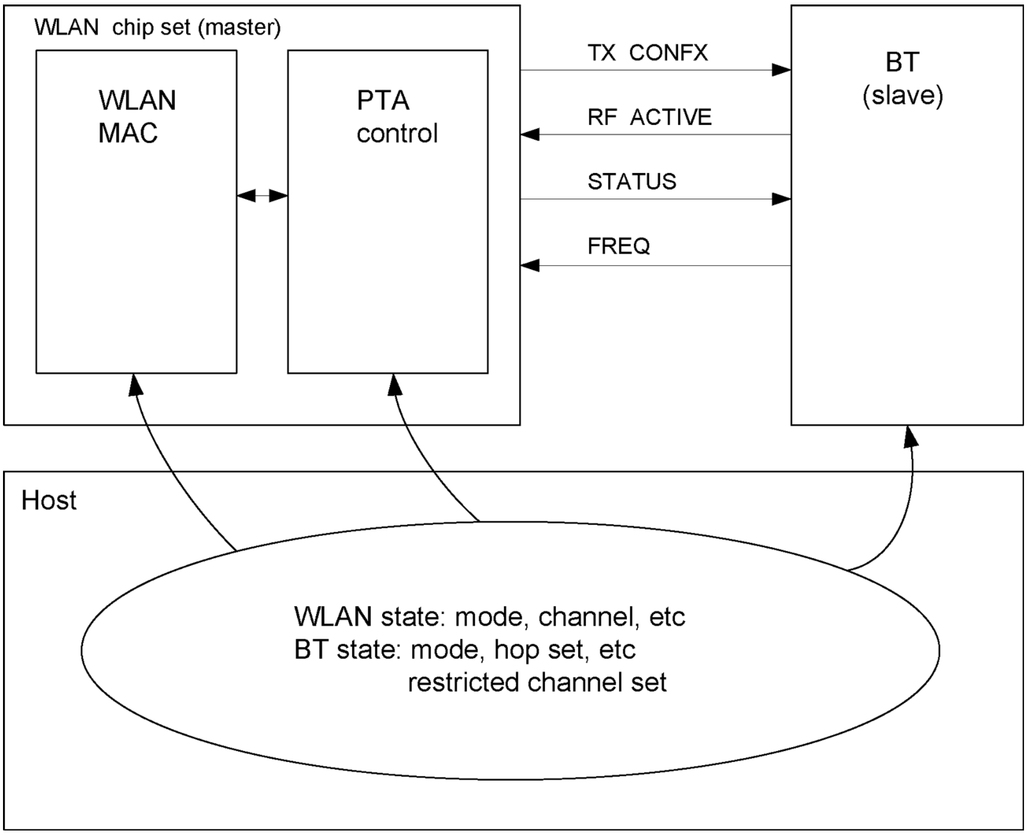
WLAN signals and interfaces

The serial interface is connected to the host SPI interface block. WLAN/BT coexistence signaling interface (CXS) enables time-shared operation of BT and WLAN transceivers so that the user perceives simultaneous operation of both systems.

WLAN interface CXS

WLAN interface CXS (Coexistence Signaling) Interface between BTH and WLAN modules is to facilitate collocation in a terminal that has BTH and WLAN.

The PTA Control state machine operates inside the WLAN chipset. In the scheme, the WLAN chipset is the master. The BT module operates as a slave to the PTA control module.



WLAN BB/MAC

The baseband chip implements OFDM/CCK digital baseband processor and ARM9-based MAC with internal SRAM memories.

MAC core implements basic IEE802.11 functions. IEEE802.11e/i protocol extensions are included to implement quality of service (QoS) and security functions.

Dedicated hardware accelerator is included for security functions (WEP and AES). Firmware and configuration parameters are downloaded from the host after power-up.

Regulators

Switching stepdown regulator generates the MAC/BB digital core supply at 1.2 V. The 2.5 V output can be further fed to inputs of the LDOs.

Two separate LDOs at 1.8 V output supply the VCO and the transceiver. The main 1.8 V supply is used for transceiver analog parts, ADC/DAC and digital circuits inside the transceiver.

LDO at 2.8 V supplies PA bias current-mode DAC and RFMD PA bias circuits.

IrDA

IrDA specifies a reliable, fully digital peer-to-peer data link between IrDA units at data rates from 9600 bits/s to 115 kbit/s. The link is based on the serial transmission of data as pulses of infra red light at the wave length of 870nm and angles of +-15degrees at the range 0 - 100 cm.

SIM interface

The device has one SIM (Subscriber Identification Module) interface. It is only accessible if battery is removed. The SIM interface consists of an internal interface between RAP and EM ASIC (N2200), and of an external interface between N2200 and SIM contacts.

The SIM IF is shown in the following figure:

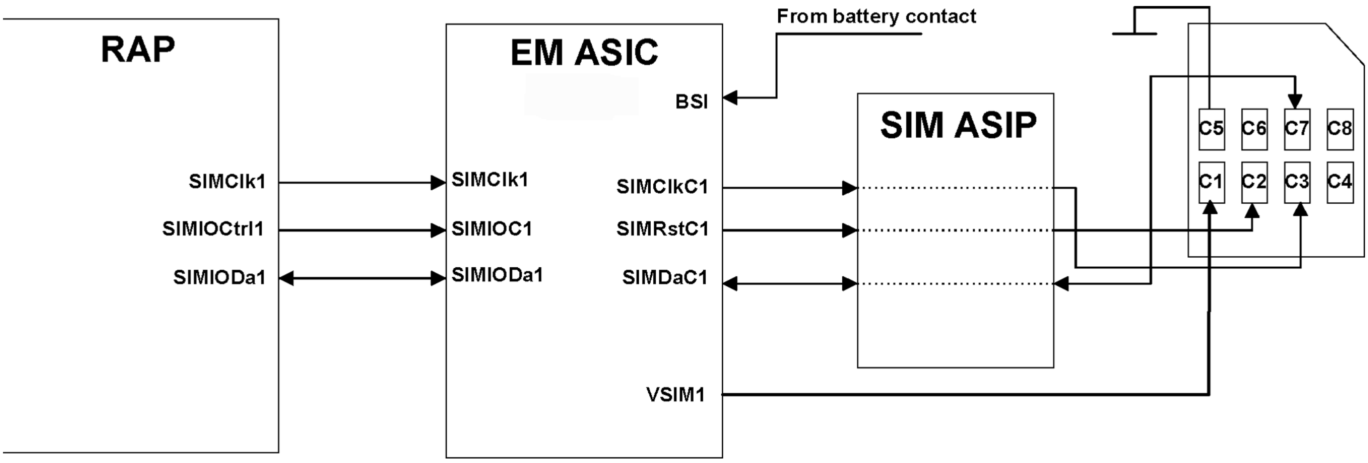

RAP
SIMClk1
SIMIOCtrl1
SIMIODa1
EM ASIC
BSI
SIMClk1
SIMIOC1
SIMIODa1
SIMClkC1
SIMRstC1
SIMDaC1
VSIM1
From battery contact
SIM ASIP
C5
C6
C7
C8
C1
C2
C3
C4

Figure 70 SIM interface

The EM ASIC handles the detection of the SIM card. The detection method is based in the BSI line. Because of the location of the SIM card, removing the battery causes a quick power down of the SIM IF.

The EM ASIC SIM1 interface supports both 1.8 V and 3.0 V SIM cards. The SIM interface voltage is first 1.8 V when the SIM card is inserted, and if the card does not response to the ATR a 3 V interface voltage is used.

The data communication between the card and the phone is asynchronous half duplex, and the clock supplied to the card is 1-5 MHz, which is 3.2 MHz by default (in GSM system). The data baud rate is the SIM card clock frequency divided by 372 (by default), 64, 32 or 16.

RS MMC interface

The reduced size (24mm x 18mm x 1.4mm) multimedia card slot is located under the battery. The device supports RS MMC hot insertion so it is possible to remove/insert the card when the phone is powered on.

RS MMC card is connected to the application processor MMC/SDIO2 (1.8V) interface. MMC interface is shown in the following figure:

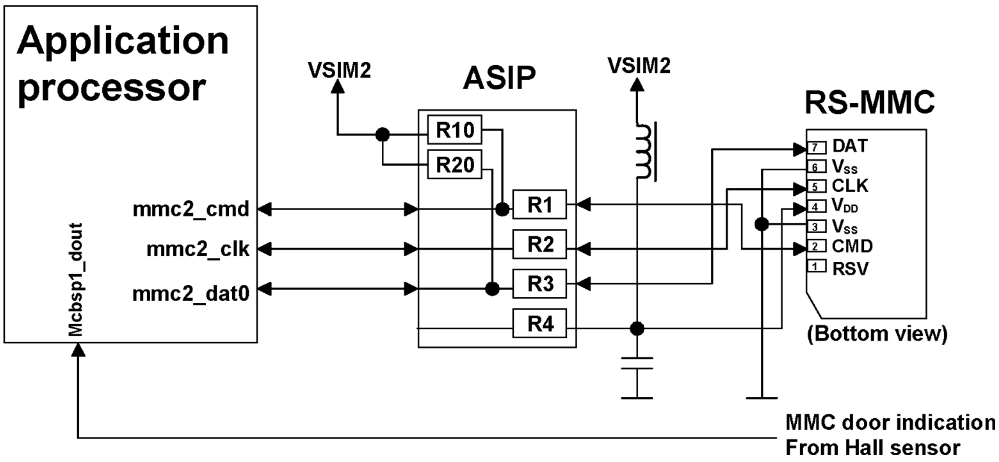

Application processor
mmc2_cmd
mmc2_clk
mmc2_dat0
Mcbsp1_dout
VSIM2
ASIP
R10
R20
R1
R2
R3
R4
VSIM2
RS-MMC
7 DAT
6 VSS
5 CLK
4 VDD
3 VSS
2 CMD
1 RSV
(Bottom view)
MMC door indication
From Hall sensor

Figure 71 MMC interface

The detection of RS MMC card removal/insertion is done via hall sensor.

Battery interface

The battery interface supports a 3-pole battery interface. The interface consists of three connectors: VBAT, BSI and GND.

The BSI line is used to recognize the battery capacity by a battery internal pull down resistor.

Battery temperature is estimated by measuring separate battery temperature NTC via the BTEMP line, which is located on the transceiver PWB, at a place where the phone temperature is most stable.

For service purposes, the device SW can be forced into local mode by using pull down resistors connected to the BSI line.

User interface

Display interface

Display features:

- Up to 16M colors within 352 x 416 pixels
- Partial display function Power saving by pausing display process on part of the screen.

The display has two different operating modes:

1 Normal mode, Full screen, up to 16M colours

2 Partial mode, 260k colors but only part of the display is active with 8 colours

The interconnection between the LCD module and the Nokia engine is implemented with a 40-pin board-to-board connector.

In partial mode all signalling is done via serial interface between display and application processor.

The display module does not require any tunings in service.

Keyboard

The device keyboard is connected to the main PWB with a board-to-board connector.

The keymatrix has six rows and four columns. The voice key on the main PWB and the navigation key are connected to the same keymatrix.

Row / Column	Col 0	Col 1	Col 2	Col 3	Col 4	Col 5
Row 0	Soft right	End	3	6	9	#
Row 1	Pen	Clear	2	5	8	0
Row 2	Soft left	Send	1	4	7	*
Row 3	Application	Joystick Enter	Joystick Left	Joystick Up	Joystick Down	Joystick Right
Row 4				Volume Up	Volume Down	Voice

Display and keyboard backlight

The device has one LED Driver (SMPS) that is used to drive both display and keyboard LEDs.

The LED driver consists of two LED chains: display LED chain and keyboard LED chain. Both chains contain four LEDs, eight in total.

The current adjustment of the driver is done from the display LED branch. The keyboard current also depends on the display brightness.

Typically, keyboard LEDs are turned ON only in dark ambient lighting conditions.

ALS interface

Ambient Light Sensor (ALS) is located in the upper part of the phone. The system consists of the following components:

- lightguide (part of the front cover)
- phototransistor (V4410) + resistor (R4415)
- NTC + resistors (R4414, R4416, R4417)
- EM ASIC (N2200)

Information on ambient lighting is used to control the backlights of the phone:

- Keypad lighting is switched on only when the environment is dark / dim
- Display backlights are dimmed, when the environment is dark / dim

The ambient light sensor itself is a photo transistor, which is temperature-compensated by an external NTC resistor. N2200 reads the light sensor (LS) and temperature (LST) results.

ALS calibration is not possible in the service points. ALS is serviced by replacing faulty phototransistors.

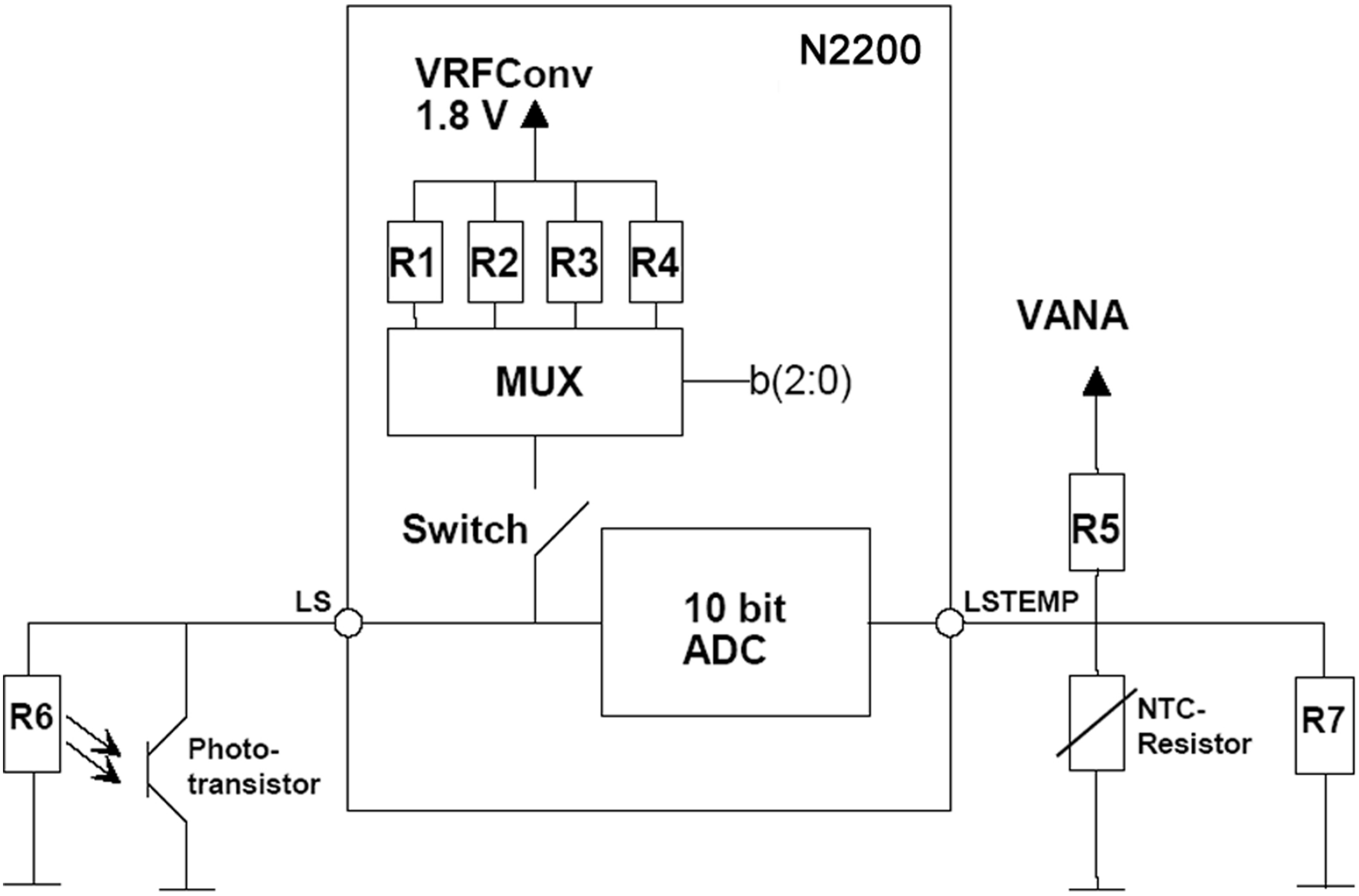


Figure 72 ALS HW implementation

Table 12 ALS resistor values

Symbol	R1	R2	R3	R4	R5	R6	R7	NTC-res
Value	5 kOhm	15 kOhm	30 kOhm	50 kOhm	470 kOhm	100 kohm	470 kohm	47 kOhm

ASICs

RAP ASIC

RAP ASIC is a 3G Radio Application Processor.

In general RAP consists of three separate parts:

- Processor subsystem (PSS) that includes the main processor and related functions
- MCU peripherals that are mainly controlled by MCU
- DSP peripherals that are mainly controlled by DSP

RAP core voltage (1.4 V) is generated from the EM ASIC (N2300) VCORE and I/O voltage (1.8 V) is from the EM ASIC (N2200) VIO. The core voltage in sleep mode is 1.05 V.

EM ASIC N2200

EM ASIC N2200 includes the following functional blocks:

- Start up logic and reset control
- Charger detection
- Battery voltage monitoring
- 32.768 kHz clock with external crystal
- Real time clock with external backup battery
- SIM card interface
- Stereo audio codecs and amplifiers
- A/D converter
- Regulators
- Vibra interface
- Digital interface (CBUS)

EM ASIC N2300

EM ASIC N2300 includes the following functional blocks:

- Core supply generation
- Charge control circuitry
- Level shifter and regulator for USB/FBUS
- Current gauge for battery current measuring
- External LED driver control interface
- Digital interface (CBUS)
- Accessory supply voltage regulator
- Vout - accessory

Device memories

RAP memories NOR flash and SDRAM

The modem memory consists of 64 Mbit SDRAM and 64 Mbit NOR flash memories.

SDRAM is a dynamic memory for ISA (Intelligent Software Architecture) SW.

NOR is used for ISA SW code and PM data and CDSP (Cellular Digital Signal Processor) SW code.

SDRAM core voltage (1.8 V) is generated from N2200 VDRAM and I/O voltage (1.8 V) is from VIO. NOR flash uses VIO for both core and I/O voltages.

Combo memory

The application processor includes a 16-bit dedicated memory interface called external memory interface fast (EMIFF).

Audio concept

Audio HW architecture

The functional core of the audio hardware is built around two ASICs: RAP and the EM ASIC N2200.

The EM ASIC N2200 provides an interface for the transducers and the accessory connector. Because audio amplifiers are also integrated into the EM ASIC N2200, the only discrete electronics components for audio paths are audio filtering components and EMC/ESD components.

There are three audio transducers:

- 8 mm dynamic earpiece
- 16 mm dynamic speaker
- electret microphone module

In addition to the audio transducers, the EM ASIC N2200 also provides an output for the dynamic vibra component.

All galvanic audio accessories are connected to the system connector.

A Bluetooth audio module, which is connected to the RAP ASIC supports Bluetooth audio functionality.

There is also a separate application ASIC for Symbian applications.

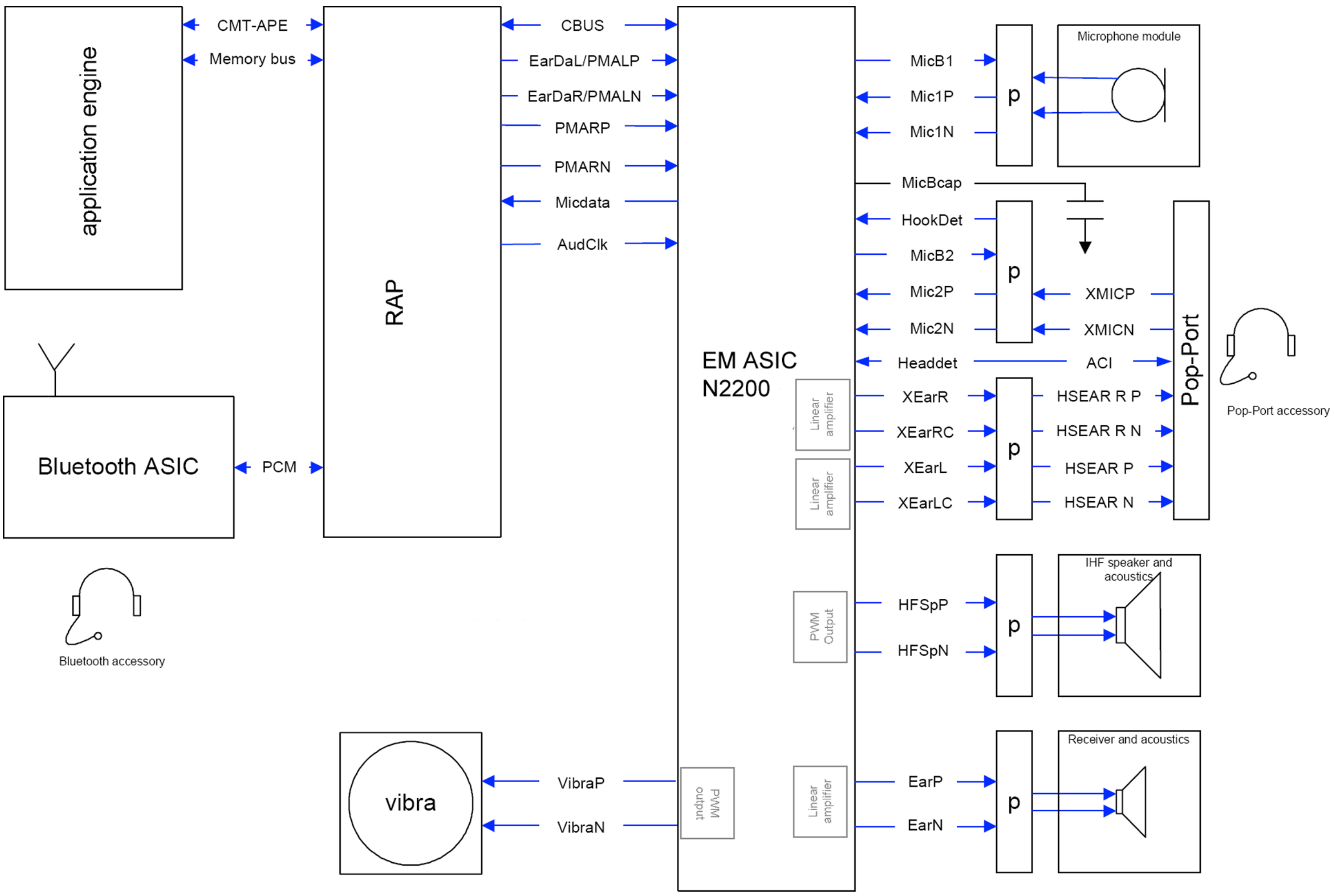

application engine
CMT-APE
Memory bus
RAP
CBUS
EarDaL/PMALP
EarDaR/PMALN
PMARP
PMARN
Micdata
AudClk
EM ASIC
N2200
Linear amplifier
Linear amplifier
PWM Output
PWM output
Linear amplifier
MicB1
Mic1P
Mic1N
MicBcap
HookDet
MicB2
Mic2P
Mic2N
Headdet
XEarR
XEarRC
XEarL
XEarLC
HFSpP
HFSpN
EarP
EarN
p
Microphone module
XMICP
XMICN
ACI
HSEAR R P
HSEAR R N
HSEAR P
HSEAR N
Pop-Port
Pop-Port accessory
IHF speaker and acoustics
Receiver and acoustics
Bluetooth ASIC
PCM
Bluetooth accessory
vibra
VibraP
VibraN

Figure 73 Audio block diagram

Internal microphone

Internal microphone is used for HandPortable (HP) and Internal HandsFree (IHF) call modes.

An analogue electret microphone is connected to N2200 Mic1P and Mic1N inputs via asymmetric electrical connection.

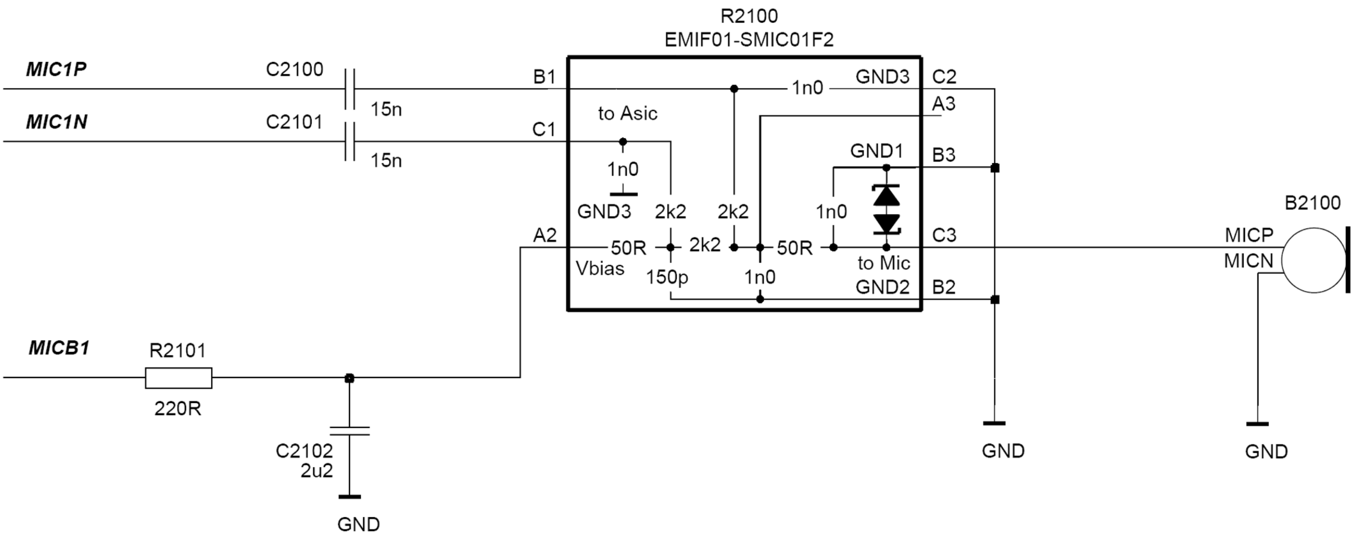

R2100
EMIF01-SMIC01F2
MIC1P
MIC1N
C2100
C2101
15n
15n
B1
C1
A2
to Asic
1n0
GND3
2k2
2k2
2k2
50R
50R
Vbias
150p
1n0
1n0
1n0
GND3
GND1
to Mic
GND2
C2
A3
B3
C3
B2
B2100
MICP
MICN
MICB1
R2101
220R
C2102
2u2
GND
GND
GND

Figure 74 Internal microphone circuitry

External microphone

Galvanic accessories are connected to the system connector.

The accessory audio mode is automatically enabled/disabled during connection/disconnection of dedicated phone accessories.

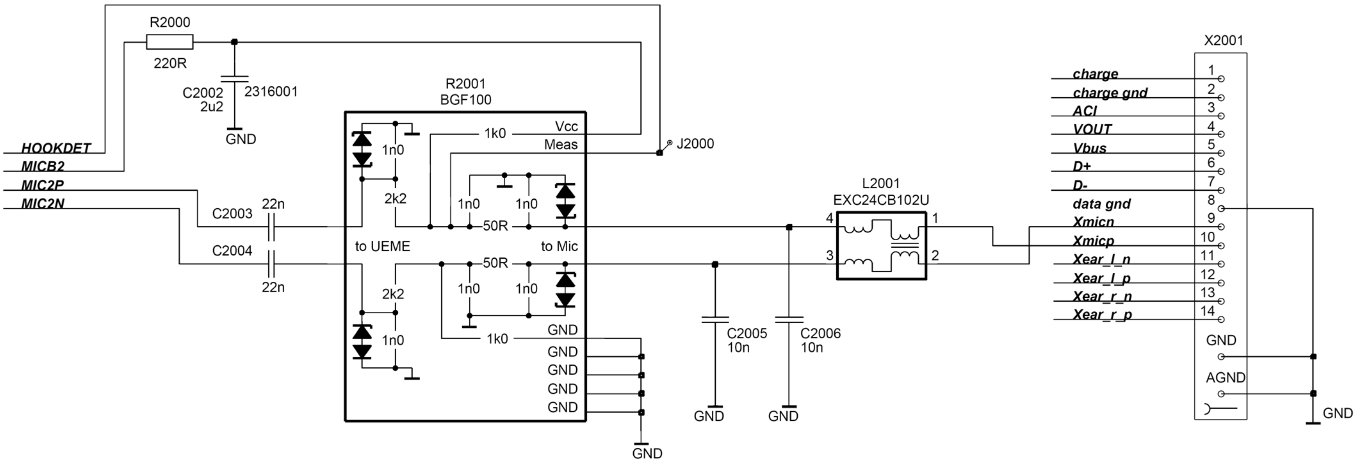

R2000
220R
C2002
2u2
2316001
GND
HOOKDET
MICB2
MIC2P
MIC2N
C2003
22n
C2004
22n
R2001
BGF100
1n0
2k2
1k0
Vcc
Meas
1n0
1n0
50R
to UEME
to Mic
50R
2k2
1n0
1n0
1n0
1k0
GND
GND
GND
GND
GND
GND
J2000
L2001
EXC24CB102U
4
1
3
2
C2005
10n
C2006
10n
GND
GND
X2001
charge
charge gnd
ACI
VOUT
Vbus
D+
D-
data gnd
Xmicn
Xmicp
Xear_l_n
Xear_l_p
Xear_r_n
Xear_r_p
1
2
3
4
5
6
7
8
9
10
11
12
13
14
GND
AGND
GND

Figure 75 External microphone circuitry (Pop-Port connects to the right side)

Internal earpiece

The internal earpiece is used in the HandPortable (HP) call mode. A dynamic 8 mm earpiece capsule is connected to N2200 differential outputs EarP and EarN.

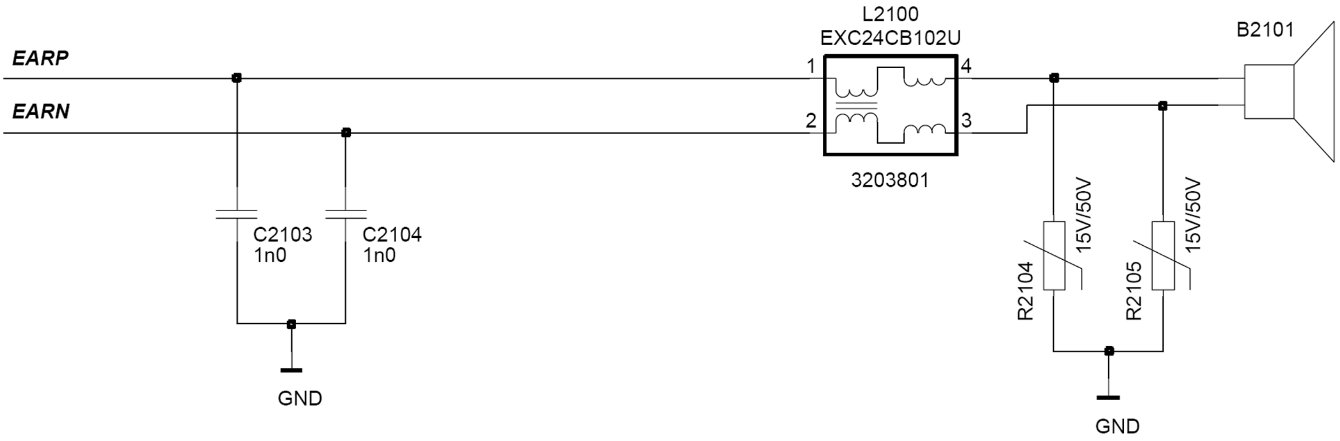

L2100
EXC24CB102U
B2101
EARP
EARN
1
2
4
3
3203801
C2103
1n0
C2104
1n0
GND
R2104
15V/50V
R2105
15V/50V
GND

Figure 76 Internal earpiece circuitry

Internal speaker

The internal speaker is used in Internal HandsFree (IHF) call mode.

A dynamic 16 mm speaker is connected to N2200 outputs HFSpP and HFSpN.

The IHF amplifier integrated in N2200 is a Digital Pulse Modulated Amplifier (DPMA).

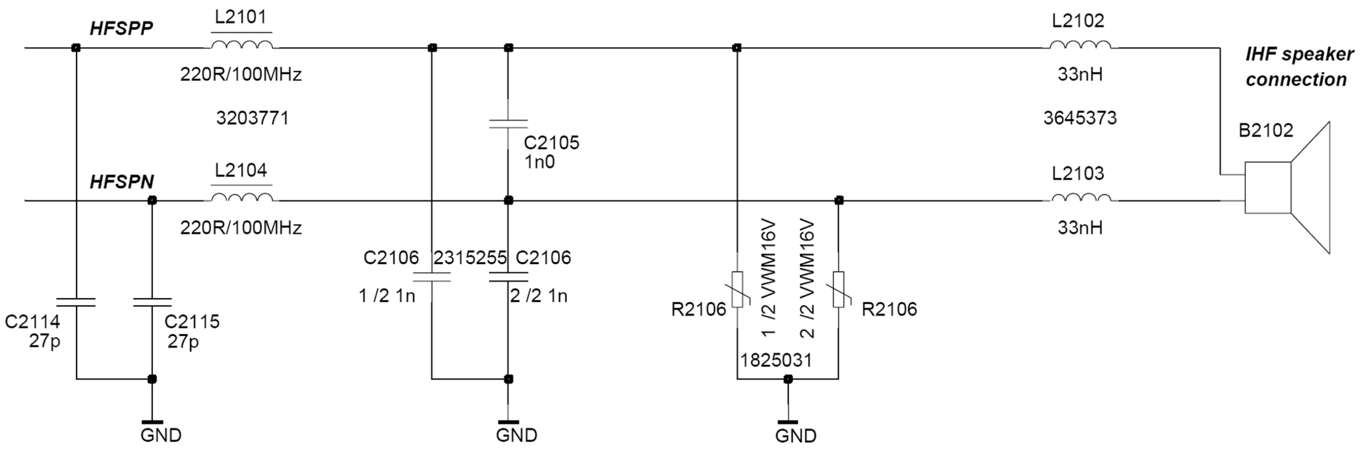

HFSPP
L2101
220R/100MHz
3203771
HFSPN
L2104
220R/100MHz
C2105
1n0
C2106
2315255
C2106
1 /2 1n
2 /2 1n
C2114
27p
C2115
27p
GND
GND
GND
R2106
R2106
1 /2 VWM16V
2 /2 VWM16V
1825031
L2102
33nH
3645373
L2103
33nH
IHF speaker
connection
B2102

Figure 77 Internal speaker circuitry

External earpiece

All galvanic accessories are connected to the system connector.

The accessory audio mode is automatically enabled/disabled during connection/disconnection of dedicated phone accessories.

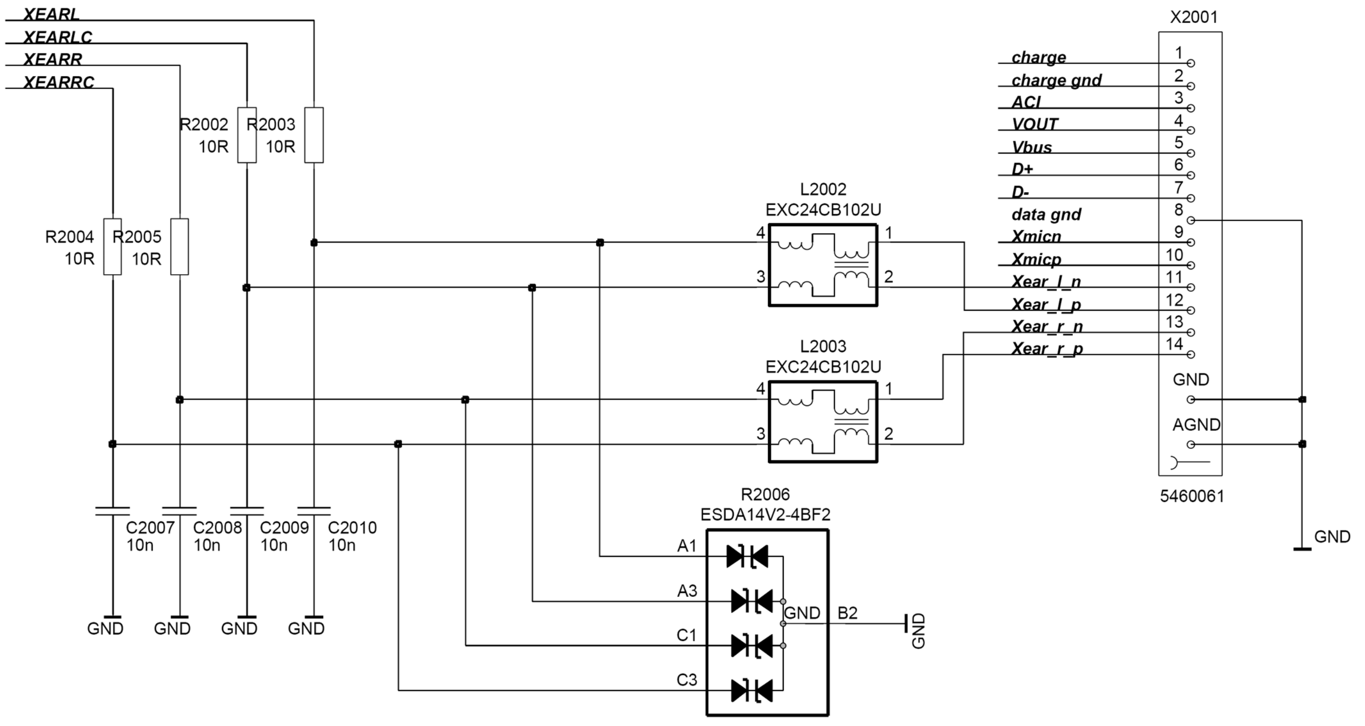

XEARL
XEARLC
XEARR
XEARRC
R2002
10R
R2003
10R
R2004
10R
R2005
10R
C2007
10n
C2008
10n
C2009
10n
C2010
10n
GND
GND
GND
GND
L2002
EXC24CB102U
L2003
EXC24CB102U
R2006
ESDA14V2-4BF2
A1
A3
C1
C3
GND
B2
GND
X2001
charge
charge gnd
ACI
VOUT
Vbus
D+
D-
data gnd
Xmicn
Xmicp
Xear_l_n
Xear_l_p
Xear_r_n
Xear_r_p
GND
AGND
5460061
GND

Figure 78 External earpiece circuitry (system connector connected on the right)

Vibra circuitry

The vibra circuitry is used for the vibra-alarm function.

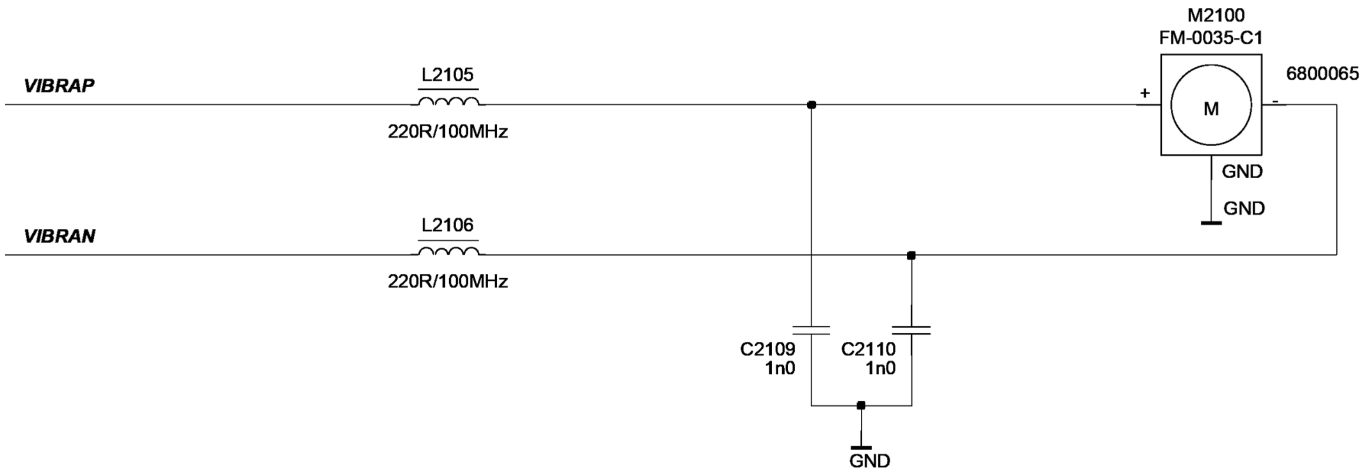

VIBRAP
VIBRAN
L2105
220R/100MHz
L2106
220R/100MHz
M2100
FM-0035-C1
6800065
+
-
M
GND
GND
C2109
1n0
C2110
1n0
GND

Figure 79 Vibra circuitry

Pop-port^{TM} connector

Pop-Port^{TM} connector provides a fully differential 4–wire stereo line-level output connection and fully differential 2-wire mono line-level or microphone level input connection.

The handsfree driver is located in EM ASIC (N2200). The gain of the handsfree driver in the differential mode is 6 dB.

The earpiece and headset signals are multiplexed so that the outputs cannot be used simultaneously.

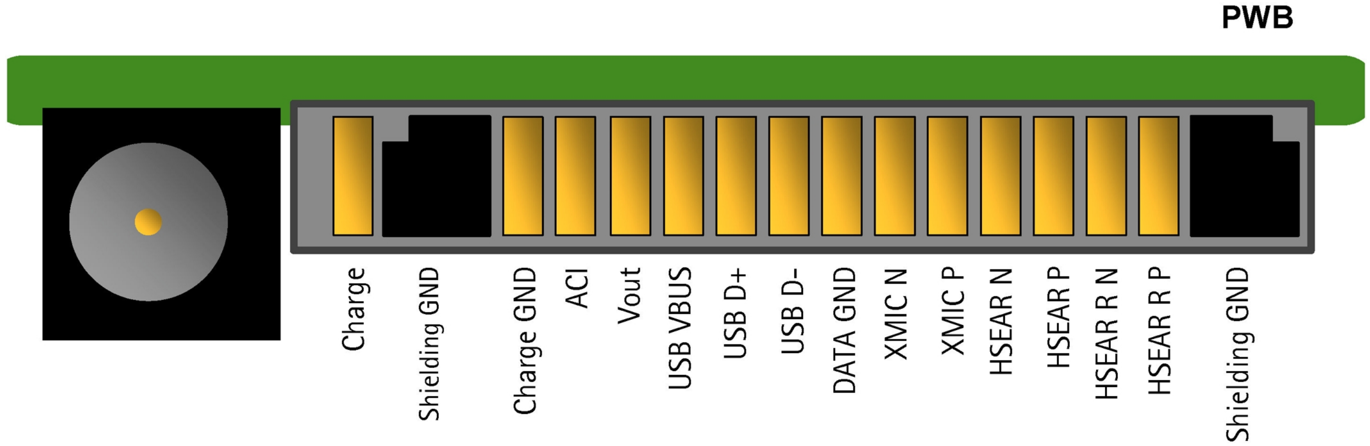

PWB
Charge
Shielding GND
Charge GND
ACI
Vout
USB VBUS
USB D+
USB D-
DATA GND
XMIC N
XMIC P
HSEAR N
HSEAR P
HSEAR R N
HSEAR R P
Shielding GND

Figure 80 External audio connector

Table 13 Audio connector pin assignments

Pin #/ Signal name	Signal description	Spectral range	Voltage/ Current levels	Max or nominal serial impedance	Notes
1/ Charge	V Charge	DC	0-9V/ 0.85A		
2/ GND	Charge GND	-	0.85A	100mΩ (PWB+ conn.)	
3/ ACI	ACI	1kbits/s	Digital 0 / 2.5-2.78V	47Ω	Insertion & removal detection

Pin #/ Signal name	Signal description	Spectral range	Voltage/ Current levels	Max or nominal serial impedance	Notes
4/ Vout	DC out	DC	2.78V 70 mA 2.5V 90mA	100mΩ (PWB+ conn.)	200mW
9 / XMIC N	Audio in	300-8k	1Vpp & 2.5-2.78VDC		
10 / XMIC P	Audio in	300-8k	1Vpp & 2.5-2.78VDC		
11 / HEAR N	Audio out	20-20k	1Vpp	10Ω	
12 / HEAR P	Audio out	20-20k	1Vpp	10Ω	
13 / HEAR R N	Audio out	20-20k	1Vpp	10Ω	Not conn. in mono
14 / HEAR R P	Audio out	20-20k	1Vpp	10Ω	Not conn. in mono

Baseband technical specifications

External interfaces

Name of Connection	Connector reference
USB	X2001
Charger	X2000
Headset	X2001
SIM	X2700
RS MMC	X5200
Battery connector	X2070

SIM IF connections

Pin	Signal	I/O	Engine connection		Notes
C1	VSIM	Out	N2200	VSIM1	Supply voltage to SIM card, 1.8 V or 3.0 V.
C2	SIMRST	Out	N2200	SIM1Rst	Reset signal to SIM card
C3	SIMCLK	Out	N2200	SIM1ClkC	Clock signal to SIM card
C5	GND	-	GND		Ground
C7	SIMDATA	In/Out	N2200	SIM1DaC	Data input / output

RS MMC interface connections

Pin	Signal	I/O	Engine connection		Notes
1	RSV		NC	NC	Reserved for future use
2	CMD	<->	D4800	MMC2_CMD	Command/ Response
3	Vss1		GND		Ground
4	V_{DD}	<-	N2200	VSIM2	VSIM2, supply voltage 1.8 (Max 70mA)
5	CLK	<-	D4800	MMC2_CLK	External clock for the MMC card, Max 20 MHz
6	Vss2		GND		Ground
7	DAT	<->	D4800	MMC2_DAT0	Bi-directional data bus
-	MMCDET	->	D4800	btwake1(in) [P10]	MMC card detect

Charger connector and charging interface connections & electrical characteristics

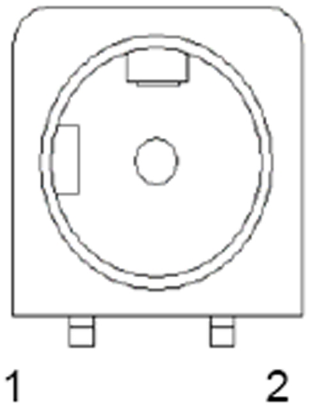


Figure 81 Charger connector

Table 14 Charging interface connections

Pin	Signal	I/O	Engine connection		Notes
1	Vchar	In	N2300	VCharIn1, 2	Charging voltage / charger detection, Center pin
2	Charge GND		Ground		Charger ground

Table 15 Charging IF electrical characteristics

Description	Parameter	Min	Max	Unit	Notes
Vchar	V Charge	0	9.3	V	Center pin
Vchar	I Charge		0.85	A	Center pin
Charge GND			0.85	A	
Threshold for charging, rising (N2300)	V_{MSTR+}	2.1		V	Typical value
Threshold for charging, falling (N2300)	V_{MSTR-}	1.9		V	Typical value

Battery connector and interface connections & electrical characteristics

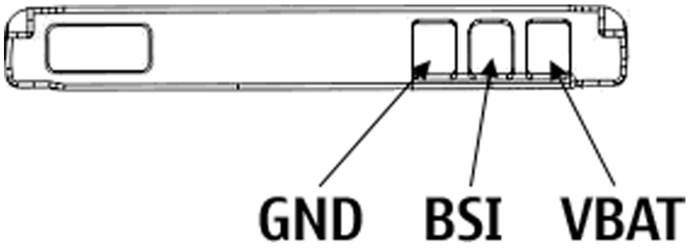


Figure 82 Battery connector

Table 16 Battery interface connections

Pin	Signal	I/O	Engine connection		Notes
1	VBAT	->	EM ASIC N2200	VBAT	Battery voltage
2	BSI	->	EM ASIC N2200	BSI	Battery size indication (fixed resistor inside the battery pack)
3	GND		GND		Ground

Table 17 Battery IF electrical characteristics

Description	Parameter	Max	Unit
Operation voltage	V_{IN}	4.23	VDC
Current rating	I_{IN}	0.9	A

Internal interfaces

Name of Connection	Connector reference	Notes
UI connector	X4400	

Name of Connection	Connector reference	Notes
Display	X4401	
ALS	V4400	Ambient Light Sensor
Vibra	M2100	
Microphone	B2100	
Earpiece	B2101	
IHF speaker	B2102	

UI module connector and IF connections

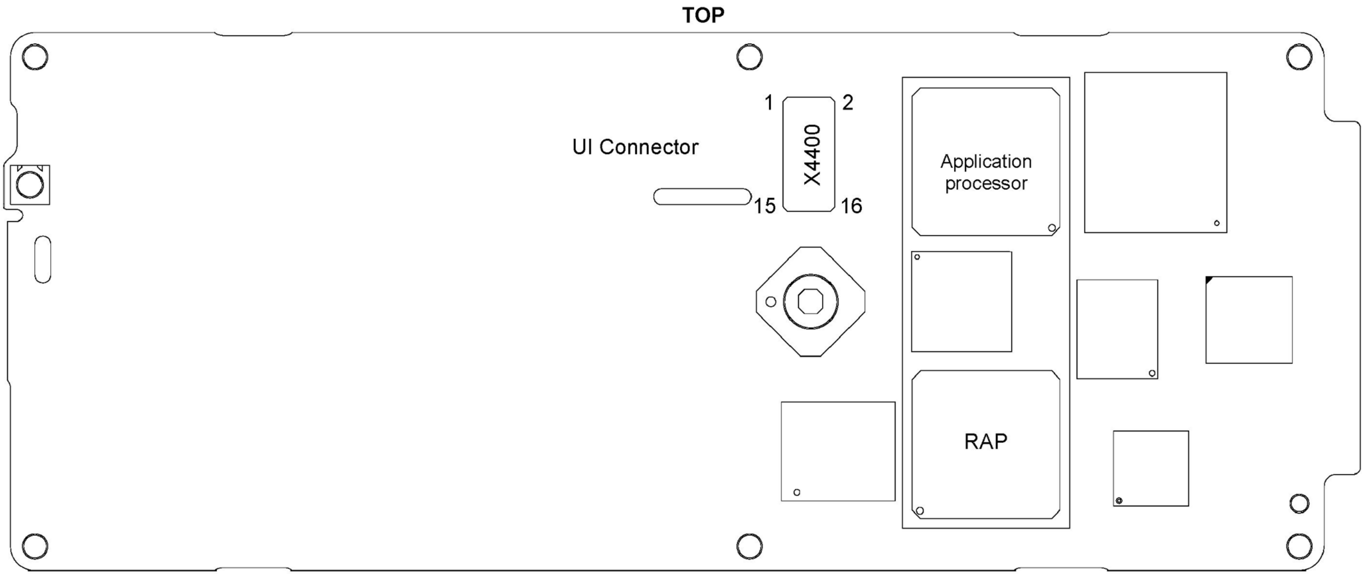


Figure 83 UI connector

Table 18 User interface connections

Pin	Signal	I/O	Engine connection		Notes
1	LED-	->	V4401		Keyboard light switch transistor
2	LED-				
3	Row 0	->	APPLICATION PROCESSOR	Kbr 0	
4	Row 1	->	APPLICATION PROCESSOR	Kbr 1	
5	Row 2	->	APPLICATION PROCESSOR	Kbr 2	
6	Row 3	->	APPLICATION PROCESSOR	Kbr 3	
7	GND		GND		
8	GND		GND		

Pin	Signal	I/O	Engine connection		Notes
9	Col 1	->	APPLICATION PROCESSOR	Kbc 1	
10	Col 0	->	APPLICATION PROCESSOR	Kbc0	
11	Col 3	->	APPLICATION PROCESSOR	Kbc 3	
12	Col 2	->	APPLICATION PROCESSOR	Kbc 2	
13	Col 4	->	APPLICATION PROCESSOR	Kbc 4	
14	Col 5	->	APPLICATION PROCESSOR	Kbc 5	
15	LED+	<-	N2301	VLEDOUT2	Discrete Backlight SMPS (controlled by
16	LED+				N2300)

Keyboard interface electrical characteristics

Description	Parameter	Min	Typ	Max	Unit	Notes
High-level input voltage	V_{IH}	0.65* V_{DDS}	V_{DDS}	0.3+ V_{DDS}	V	Row
Low-level input voltage	V_{IL}	-0.3	0	0.35* V_{DDS}	V	Row
High-level output voltage	V_{OH}	1.62	V_{DDS}	1.98	V	Column
Low-level output voltage	V_{OL}		0	0.45	V	Column
(VDDS = 1.8V)						

Display connector and interface connections

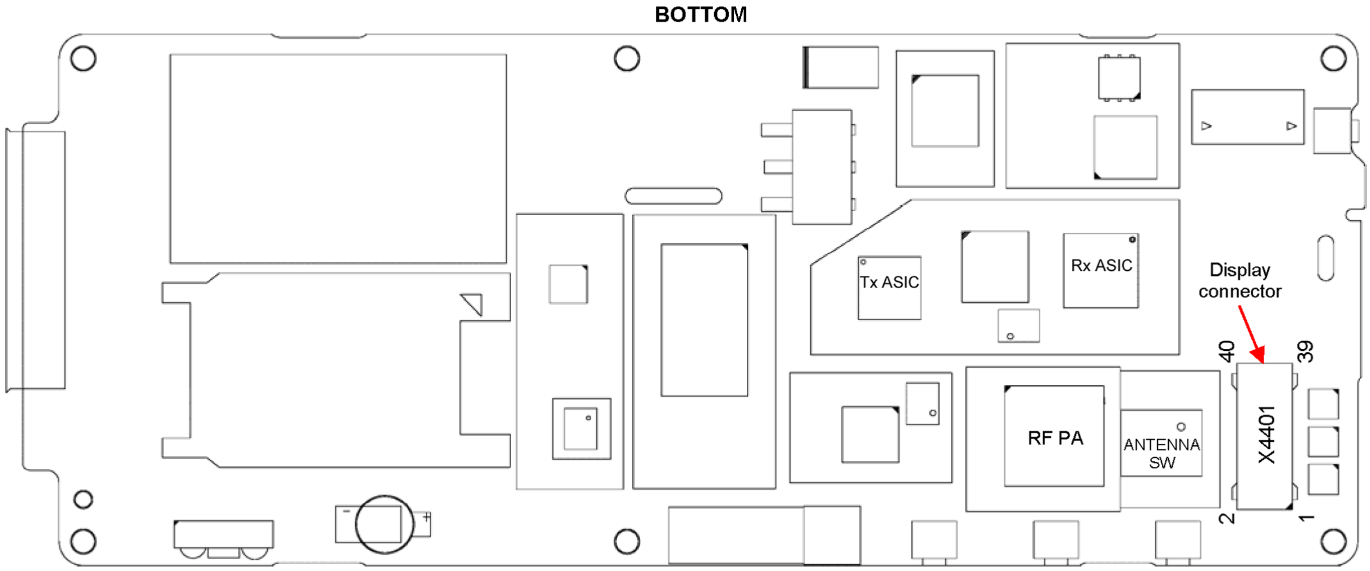


Figure 84 Display connector

Table 19 Display interface connections

Pin	Signal	I/O	Engine Connection		Notes
1	XRES	<-	Sandstom IC	ResetX	Reset (Active Low)
2	HS	<-	Sandstom IC	HS	Horizontal sync.
3	VS	<-	Sandstom IC	VS	Vertical sync.
4	R5	<-	Sandstom IC	VD17	Data 17
5	R3	<-	Sandstom IC	VD15	Data 15
6	GND		GND		Ground
7	R1	<-	Sandstom IC	VD13	Data 13
8	G5	<-	Sandstom IC	VD11	Data 11
9	G3	<-	Sandstom IC	VD9	Data 9
10	G1	<-	Sandstom IC	VD7	Data 7
11	GND		GND		Ground
12	B5	<-	Sandstom IC	VD5	Data 5
13	B3	<-	Sandstom IC	VD3	Data 3
14	B1	<-	Sandstom IC	VD1	Data 1
15	SCL	<-	APPLICATION PROCESSOR	Spiclk	Serial clock
16	GND		GND		Ground
17	VDDI		N2200	VIO	Digital power
18	VDD		N2200	VAUX	Analog power

Pin	Signal	I/O	Engine Connection		Notes
19	GND		GND		Ground
20	LEDIN		LED driver		Supply voltage for LEDs
21	LEDOUT		LED driver		Supply voltage for LEDs
22	GND		GND		Ground
23	XCS	<-	APPLICATION PROCESSOR	spi_ncs0	Chip select
24	DOUT	->	APPLICATION PROCESSOR	Spidin	Serial data
25	DIN	<-	APPLICATION PROCESSOR	Spidout	Serial data
26	B0	<-	Sandstom IC	VD0	Data 0
27	B2	<-	Sandstom IC	VD2	Data 2
28	GND		GND		Ground
29	B4	<-	Sandstom IC	VD4	Data 4
30	G0	<-	Sandstom IC	VD6	Data 6
31	G2	<-	Sandstom IC	VD8	Data 8
32	GND		GND		Ground
33	G4	<-	Sandstom IC	VD10	Data 10
34	R0	<-	Sandstom IC	VD12	Data 12
35	R2	<-	Sandstom IC	VD14	Data 14
36	R4	<-	Sandstom IC	VD16	Data 16
37	GND		GND		Ground
38	PCLK	<-	Sandstom IC	PCLK	Pixel clock
39	GND		GND		Ground
40	DE	<-	Sandstom IC	DE	Data enable

Back-up battery interface connections and electrical characteristics

Table 20 Back-up battery connections

Pin name	I/O	Connection	Notes
VBack	->	N2200, VBack	Back-up battery G2200 is connected to N2200

Table 21 Back-up battery electrical characteristics

Description	Parameter	Min	Typ	Max	Unit
Back-Up Battery Voltage	Vback	0	2.5	2.7	V

RF description

Introduction to receiver functionality

Receiver functions are implemented in an RF ASIC.

The receiver is a linear direct conversion receiver consisting of separate front ends (LNA (Low Noise Amplifier) and demodulator) for each supported system. After the demodulators, the signal paths are combined to one common BB path.

WCDMA receiver functionality

In the WCDMA mode, the received signal is fed from the antenna to a duplex filter. After the duplex filter the signal goes via a balun to an LNA (Low Noise Amplifier) residing in N7500. From the LNA, the signal goes trough a band pass filter.

After filtering, the signal goes to the down conversion mixer, which converts the signal to baseband I and Q signals. At the BB frequency the signal is amplified, and fed to a low pass filter. The Rx channel filter must be calibrated with an automatic routine whenever the Rx ASIC IC is changed to a phone.

In the WCDMA mode, the corner frequency of the filter is set to approximately 2.1 MHz. The filter is followed by an AGC (Automatic Gain Control) amplifier with an adjustable gain. The signal is further amplified before it is fed to balanced analogue IQ output pins. The analogue output pins are accompanied by reference voltage output, which sets the DC level for the AD converter in the BB ASIC RAP.

The last stage of the RF Rx chain is an output buffer which feeds the signal and a reference voltage (VREFCM) to the BB ASIC.

GSM receiver functionality

As GSM Rx branches are functionally identical, the following description is applicable to all of them.

The received signal goes from the GSM antenna to the antenna switch module.

The antenna switch module is followed by integrated LNAs residing in the Rx ASIC.

The LNAs are followed by demodulators which downconvert the signal to baseband I and Q signals.

After the down conversion mixer, the Rx chain is similar to the WCDMA Rx. The channel select filter is set to 115 kHz in the GSM mode.

Introduction to transmitter functionality

Transmitter functions are implemented in an RF ASIC. The ASIC contains a BB frequency low pass filter, which is tunable according to the signal bandwidth of the system in use.

In addition, the ASIC contains separate RF paths comprising a final frequency IQ modulator and VGA amplifiers.

WCDMA transmitter functionality

In the transmitter side, an analogue I/Q modulated signal is received from digital baseband into an RF ASIC and fed through a low pass filter. After the filter the signal is fed to the IQ modulator, which converts the signal to final Tx frequency. There are two separate I/Q modulators: one for WCDMA and another for GSM signals. The signal then exits the RF ASIC via a balanced line. Next, the signal is band pass filtered by a SAW filter before it is fed to the WCDMA PA module. After the PA, the transmitted WCDMA signal is fed through an isolator and a duplex filter to the antenna.

WCDMA power control

WCDMA Tx power control is accomplished by the two VGA amplifier stages in the Tx ASIC.

The VGAs have a common temperature compensation circuit and one voltage mode analogue input for gain control (TXC).

Another function of the detector voltage is to steer the DC/DC converter, which is providing a variable supply voltage for the WCDMA PA.

WCDMA PA module

The WCDMA PA is housed in a separate module having:

- a variable supply voltage input for the amplifier stages (Vcc11),
- a battery supply voltage for the bias circuits (Vcc12),
- and two bias current inputs.

Bias currents are generated by 5-bit DA converters in the RF ASIC.

If a different manufacturer's PA is changed to the phone, this setting must be set again.

PA DC/DC converter

The control of the DC/DC converter is fed back from the power detector circuit.

GSM transmitter functionality

An RF ASIC receives an analogue IQ modulated signal from digital BB, which is first low pass filtered with filter corner frequency set to approximately 200 kHz. After the filter, the signal is routed to the GSM modulator.

After the VGA stage the signal exits the RF ASIC. In case of GSM1800/1900 the signal goes directly to the GSM PA module. In case of EGSM900 (and GSM850), the PA module is preceded by a SAW filter. After the filter, the signal is fed to the GSM PA module. Finally, the signal is routed via the antenna switch to the antenna.

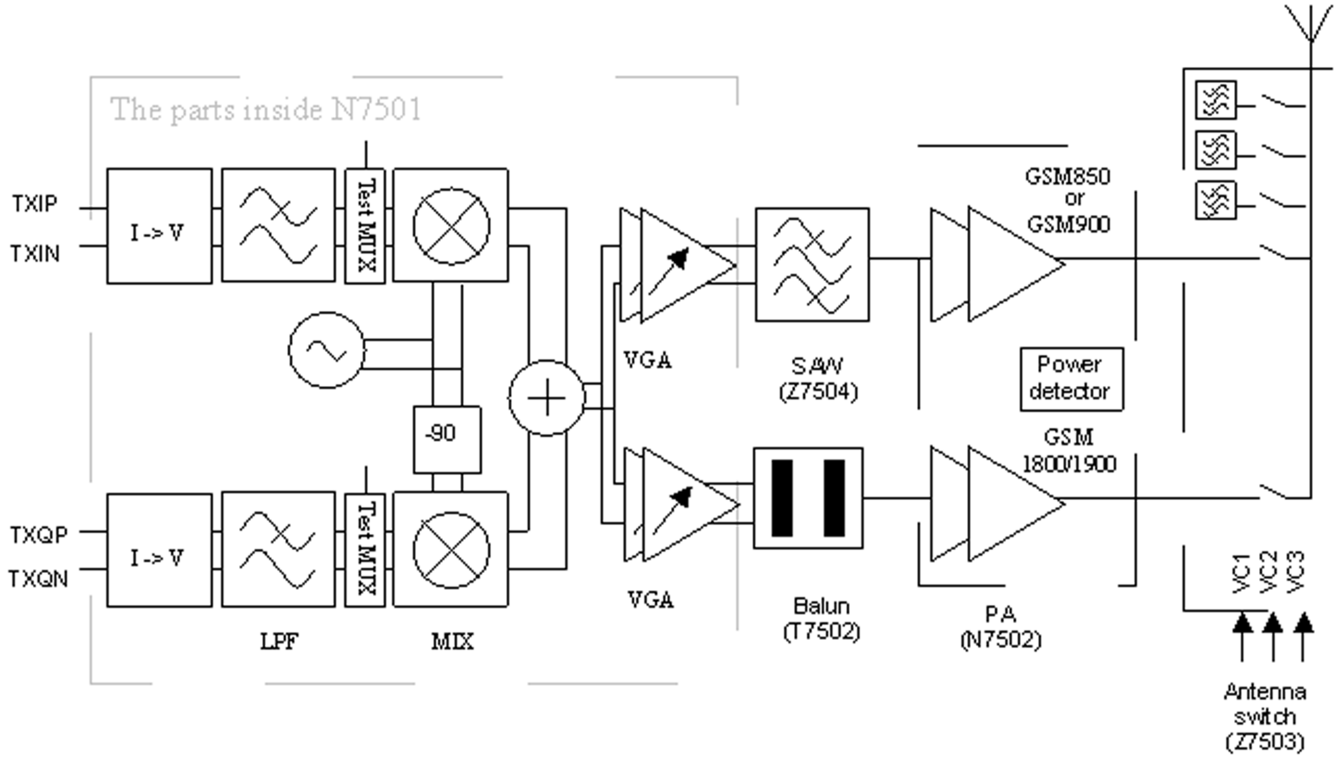

The parts inside N7501
TXIP
TXIN
I -> V
Test MUX
-90
TXQP
TXQN
I -> V
Test MUX
LPF
MIX
VGA
VGA
SAW
(Z7504)
Balun
(T7502)
GSM850
or
GSM900
Power
detector
GSM
1800/1900
PA
(N7502)
VC1
VC2
VC3
Antenna
switch
(Z7503)

Figure 85 GSM transmitter

GSM power control

A closed control loop comprise an integrated power detector (in PA module) and an error amplifier. The error amplifier resides in N7501, and it controls the transmitter power of GSM.

GSM PA module

A single GSM/EDGE PA module contains two separate amplifier chains, one for EGSM900 (and GSM850) and another for GSM1800/1900. Both amplifiers have a battery supply connection and two bias current inputs.

Frequency synthesizers

RF has separate synthesizers for Rx and Tx. Both synthesizers consist of:

- PLL (Phase-Locked Loop)
- loop filter
- VCO (Voltage Controlled Oscillator)
- balun

The VCO frequencies are locked by PLLs into a reference oscillator, VCTCXO (Voltage Controlled Temperature Compensated Crystal Oscillator).

The PLLs are located in RF ASICs and controlled via RFBus.

The VCOs operate at the channel frequency multiplied by two in the upper bands and by four in EGSM900 (and GSM850, if applicable). The required frequency dividers required for modulators and demodulators are integrated into RF ASICs. The dividers are controlled via RFBus.

Reference oscillators

A 38.4MHz VCTCXO is used as a reference oscillator for the frequency synthesizers.

Regulators

RF ASICs contain integrated regulators to supply regulated voltages for their internal circuitry and other RF parts. Rx VCO supply is got via a switch from an RF ASIC VR1 regulator.

Frequency mappings

EGSM900 frequencies

CH	TX	RX	VCO TX	VCO RX	CH	TX	RX	VCO TX	VCO RX	CH	TX	RX	VCO TX	VCO RX
975	880,2	925,2	3520,8	3700,8	1	890,2	935,2	3560,8	3740,8	63	902,6	947,6	3610,4	3790,4
976	880,4	925,4	3521,6	3701,6	2	890,4	935,4	3561,6	3741,6	64	902,8	947,8	3611,2	3791,2
977	880,6	925,6	3522,4	3702,4	3	890,6	935,6	3562,4	3742,4	65	903,0	948,0	3612,0	3792,0
978	880,8	925,8	3523,2	3703,2	4	890,8	935,8	3563,2	3743,2	66	903,2	948,2	3612,8	3792,8
979	881,0	926,0	3524,0	3704,0	5	891,0	936,0	3564,0	3744,0	67	903,4	948,4	3613,6	3793,6
980	881,2	926,2	3524,8	3704,8	6	891,2	936,2	3564,8	3744,8	68	903,6	948,6	3614,4	3794,4
981	881,4	926,4	3525,6	3705,6	7	891,4	936,4	3565,6	3745,6	69	903,8	948,8	3615,2	3795,2
982	881,6	926,6	3526,4	3706,4	8	891,6	936,6	3566,4	3746,4	70	904,0	949,0	3616,0	3796,0
983	881,8	926,8	3527,2	3707,2	9	891,8	936,8	3567,2	3747,2	71	904,2	949,2	3616,8	3796,8
984	882,0	927,0	3528,0	3708,0	10	892,0	937,0	3568,0	3748,0	72	904,4	949,4	3617,6	3797,6
985	882,2	927,2	3528,8	3708,8	11	892,2	937,2	3568,8	3748,8	73	904,6	949,6	3618,4	3798,4
986	882,4	927,4	3529,6	3709,6	12	892,4	937,4	3569,6	3749,6	74	904,8	949,8	3619,2	3799,2
987	882,6	927,6	3530,4	3710,4	13	892,6	937,6	3570,4	3750,4	75	905,0	950,0	3620,0	3800,0
988	882,8	927,8	3531,2	3711,2	14	892,8	937,8	3571,2	3751,2	76	905,2	950,2	3620,8	3800,8
989	883,0	928,0	3532,0	3712,0	15	893,0	938,0	3572,0	3752,0	77	905,4	950,4	3621,6	3801,6
990	883,2	928,2	3532,8	3712,8	16	893,2	938,2	3572,8	3752,8	78	905,6	950,6	3622,4	3802,4
991	883,4	928,4	3533,6	3713,6	17	893,4	938,4	3573,6	3753,6	79	905,8	950,8	3623,2	3803,2
992	883,6	928,6	3534,4	3714,4	18	893,6	938,6	3574,4	3754,4	80	906,0	951,0	3624,0	3804,0
993	883,8	928,8	3535,2	3715,2	19	893,8	938,8	3575,2	3755,2	81	906,2	951,2	3624,8	3804,8
994	884,0	929,0	3536,0	3716,0	20	894,0	939,0	3576,0	3756,0	82	906,4	951,4	3625,6	3805,6
995	884,2	929,2	3536,8	3716,8	21	894,2	939,2	3576,8	3756,8	83	906,6	951,6	3626,4	3806,4
996	884,4	929,4	3537,6	3717,6	22	894,4	939,4	3577,6	3757,6	84	906,8	951,8	3627,2	3807,2
997	884,6	929,6	3538,4	3718,4	23	894,6	939,6	3578,4	3758,4	85	907,0	952,0	3628,0	3808,0
998	884,8	929,8	3539,2	3719,2	24	894,8	939,8	3579,2	3759,2	86	907,2	952,2	3628,8	3808,8
999	885,0	930,0	3540,0	3720,0	25	895,0	940,0	3580,0	3760,0	87	907,4	952,4	3629,6	3809,6
1000	885,2	930,2	3540,8	3720,8	26	895,2	940,2	3580,8	3760,8	88	907,6	952,6	3630,4	3810,4
1001	885,4	930,4	3541,6	3721,6	27	895,4	940,4	3581,6	3761,6	89	907,8	952,8	3631,2	3811,2
1002	885,6	930,6	3542,4	3722,4	28	895,6	940,6	3582,4	3762,4	90	908,0	953,0	3632,0	3812,0
1003	885,8	930,8	3543,2	3723,2	29	895,8	940,8	3583,2	3763,2	91	908,2	953,2	3632,8	3812,8
1004	886,0	931,0	3544,0	3724,0	30	896,0	941,0	3584,0	3764,0	92	908,4	953,4	3633,6	3813,6
1005	886,2	931,2	3544,8	3724,8	31	896,2	941,2	3584,8	3764,8	93	908,6	953,6	3634,4	3814,4
1006	886,4	931,4	3545,6	3725,6	32	896,4	941,4	3585,6	3765,6	94	908,8	953,8	3635,2	3815,2
1007	886,6	931,6	3546,4	3726,4	33	896,6	941,6	3586,4	3766,4	95	909,0	954,0	3636,0	3816,0
1008	886,8	931,8	3547,2	3727,2	34	896,8	941,8	3587,2	3767,2	96	909,2	954,2	3636,8	3816,8
1009	887,0	932,0	3548,0	3728,0	35	897,0	942,0	3588,0	3768,0	97	909,4	954,4	3637,6	3817,6
1010	887,2	932,2	3548,8	3728,8	36	897,2	942,2	3588,8	3768,8	98	909,6	954,6	3638,4	3818,4
1011	887,4	932,4	3549,6	3729,6	37	897,4	942,4	3589,6	3769,6	99	909,8	954,8	3639,2	3819,2
1012	887,6	932,6	3550,4	3730,4	38	897,6	942,6	3590,4	3770,4	100	910,0	955,0	3640,0	3820,0
1013	887,8	932,8	3551,2	3731,2	39	897,8	942,8	3591,2	3771,2	101	910,2	955,2	3640,8	3820,8
1014	888,0	933,0	3552,0	3732,0	40	898,0	943,0	3592,0	3772,0	102	910,4	955,4	3641,6	3821,6
1015	888,2	933,2	3552,8	3732,8	41	898,2	943,2	3592,8	3772,8	103	910,6	955,6	3642,4	3822,4
1016	888,4	933,4	3553,6	3733,6	42	898,4	943,4	3593,6	3773,6	104	910,8	955,8	3643,2	3823,2
1017	888,6	933,6	3554,4	3734,4	43	898,6	943,6	3594,4	3774,4	105	911,0	956,0	3644,0	3824,0
1018	888,8	933,8	3555,2	3735,2	44	898,8	943,8	3595,2	3775,2	106	911,2	956,2	3644,8	3824,8
1019	889,0	934,0	3556,0	3736,0	45	899,0	944,0	3596,0	3776,0	107	911,4	956,4	3645,6	3825,6
1020	889,2	934,2	3556,8	3736,8	46	899,2	944,2	3596,8	3776,8	108	911,6	956,6	3646,4	3826,4
1021	889,4	934,4	3557,6	3737,6	47	899,4	944,4	3597,6	3777,6	109	911,8	956,8	3647,2	3827,2
1022	889,6	934,6	3558,4	3738,4	48	899,6	944,6	3598,4	3778,4	110	912,0	957,0	3648,0	3828,0
1023	889,8	934,8	3559,2	3739,2	49	899,8	944,8	3599,2	3779,2	111	912,2	957,2	3648,8	3828,8
0	890,0	935,0	3560,0	3740,0	50	900,0	945,0	3600,0	3780,0	112	912,4	957,4	3649,6	3829,6
					51	900,2	945,2	3600,8	3780,8	113	912,6	957,6	3650,4	3830,4
					52	900,4	945,4	3601,6	3781,6	114	912,8	957,8	3651,2	3831,2
					53	900,6	945,6	3602,4	3782,4	115	913,0	958,0	3652,0	3832,0
					54	900,8	945,8	3603,2	3783,2	116	913,2	958,2	3652,8	3832,8
					55	901,0	946,0	3604,0	3784,0	117	913,4	958,4	3653,6	3833,6
					56	901,2	946,2	3604,8	3784,8	118	913,6	958,6	3654,4	3834,4
					57	901,4	946,4	3605,6	3785,6	119	913,8	958,8	3655,2	3835,2
					58	901,6	946,6	3606,4	3786,4	120	914,0	959,0	3656,0	3836,0
					59	901,8	946,8	3607,2	3787,2	121	914,2	959,2	3656,8	3836,8
					60	902,0	947,0	3608,0	3788,0	122	914,4	959,4	3657,6	3837,6
					61	902,2	947,2	3608,8	3788,8	123	914,6	959,6	3658,4	3838,4
					62	902,4	947,4	3609,6	3789,6	124	914,8	959,8	3659,2	3839,2

GSM1800 frequencies

Ch	Tx	Rx	VCO Tx	VCO Rx	Ch	Tx	Rx	VCO Tx	VCO Rx	Ch	Tx	Rx	VCO Tx	VCO Rx	Ch	Tx	Rx	VCO Tx	VCO Rx
512	1710.2	1805.2	3420.4	3610.4	606	1729.0	1824.0	3458.0	3648.0	700	1747.8	1842.8	3495.6	3685.6	793	1766.4	1861.4	3532.8	3722.8
513	1710.4	1805.4	3420.8	3610.8	607	1729.2	1824.2	3458.4	3648.4	701	1748.0	1843.0	3496.0	3686.0	794	1766.6	1861.6	3533.2	3723.2
514	1710.6	1805.6	3421.2	3611.2	608	1729.4	1824.4	3458.8	3648.8	702	1748.2	1843.2	3496.4	3686.4	795	1766.8	1861.8	3533.6	3723.6
515	1710.8	1805.8	3421.6	3611.6	609	1729.6	1824.6	3459.2	3649.2	703	1748.4	1843.4	3496.8	3686.8	796	1767.0	1862.0	3534.0	3724.0
516	1711.0	1806.0	3422.0	3612.0	610	1729.8	1824.8	3459.6	3649.6	704	1748.6	1843.6	3497.2	3687.2	797	1767.2	1862.2	3534.4	3724.4
517	1711.2	1806.2	3422.4	3612.4	611	1730.0	1825.0	3460.0	3650.0	705	1748.8	1843.8	3497.6	3687.6	798	1767.4	1862.4	3534.8	3724.8
518	1711.4	1806.4	3422.8	3612.8	612	1730.2	1825.2	3460.4	3650.4	706	1749.0	1844.0	3498.0	3688.0	799	1767.6	1862.6	3535.2	3725.2
519	1711.6	1806.6	3423.2	3613.2	613	1730.4	1825.4	3460.8	3650.8	707	1749.2	1844.2	3498.4	3688.4	800	1767.8	1862.8	3535.6	3725.6
520	1711.8	1806.8	3423.6	3613.6	614	1730.6	1825.6	3461.2	3651.2	708	1749.4	1844.4	3498.8	3688.8	801	1768.0	1863.0	3536.0	3726.0
521	1712.0	1807.0	3424.0	3614.0	615	1730.8	1825.8	3461.6	3651.6	709	1749.6	1844.6	3499.2	3689.2	802	1768.2	1863.2	3536.4	3726.4
522	1712.2	1807.2	3424.4	3614.4	616	1731.0	1826.0	3462.0	3652.0	710	1749.8	1844.8	3499.6	3689.6	803	1768.4	1863.4	3536.8	3726.8
523	1712.4	1807.4	3424.8	3614.8	617	1731.2	1826.2	3462.4	3652.4	711	1750.0	1845.0	3500.0	3690.0	804	1768.6	1863.6	3537.2	3727.2
524	1712.6	1807.6	3425.2	3615.2	618	1731.4	1826.4	3462.8	3652.8	712	1750.2	1845.2	3500.4	3690.4	805	1768.8	1863.8	3537.6	3727.6
525	1712.8	1807.8	3425.6	3615.6	619	1731.6	1826.6	3463.2	3653.2	713	1750.4	1845.4	3500.8	3690.8	806	1769.0	1864.0	3538.0	3728.0
526	1713.0	1808.0	3426.0	3616.0	620	1731.8	1826.8	3463.6	3653.6	714	1750.6	1845.6	3501.2	3691.2	807	1769.2	1864.2	3538.4	3728.4
527	1713.2	1808.2	3426.4	3616.4	621	1732.0	1827.0	3464.0	3654.0	715	1750.8	1845.8	3501.6	3691.6	808	1769.4	1864.4	3538.8	3728.8
528	1713.4	1808.4	3426.8	3616.8	622	1732.2	1827.2	3464.4	3654.4	716	1751.0	1846.0	3502.0	3692.0	809	1769.6	1864.6	3539.2	3729.2
529	1713.6	1808.6	3427.2	3617.2	623	1732.4	1827.4	3464.8	3654.8	717	1751.2	1846.2	3502.4	3692.4	810	1769.8	1864.8	3539.6	3729.6
530	1713.8	1808.8	3427.6	3617.6	624	1732.6	1827.6	3465.2	3655.2	718	1751.4	1846.4	3502.8	3692.8	811	1770.0	1865.0	3540.0	3730.0
531	1714.0	1809.0	3428.0	3618.0	625	1732.8	1827.8	3465.6	3655.6	719	1751.6	1846.6	3503.2	3693.2	812	1770.2	1865.2	3540.4	3730.4
532	1714.2	1809.2	3428.4	3618.4	626	1733.0	1828.0	3466.0	3656.0	720	1751.8	1846.8	3503.6	3693.6	813	1770.4	1865.4	3540.8	3730.8
533	1714.4	1809.4	3428.8	3618.8	627	1733.2	1828.2	3466.4	3656.4	721	1752.0	1847.0	3504.0	3694.0	814	1770.6	1865.6	3541.2	3731.2
534	1714.6	1809.6	3429.2	3619.2	628	1733.4	1828.4	3466.8	3656.8	722	1752.2	1847.2	3504.4	3694.4	815	1770.8	1865.8	3541.6	3731.6
535	1714.8	1809.8	3429.6	3619.6	629	1733.6	1828.6	3467.2	3657.2	723	1752.4	1847.4	3504.8	3694.8	816	1771.0	1866.0	3542.0	3732.0
536	1715.0	1810.0	3430.0	3620.0	630	1733.8	1828.8	3467.6	3657.6	724	1752.6	1847.6	3505.2	3695.2	817	1771.2	1866.2	3542.4	3732.4
537	1715.2	1810.2	3430.4	3620.4	631	1734.0	1829.0	3468.0	3658.0	725	1752.8	1847.8	3505.6	3695.6	818	1771.4	1866.4	3542.8	3732.8
538	1715.4	1810.4	3430.8	3620.8	632	1734.2	1829.2	3468.4	3658.4	726	1753.0	1848.0	3506.0	3696.0	819	1771.6	1866.6	3543.2	3733.2
539	1715.6	1810.6	3431.2	3621.2	633	1734.4	1829.4	3468.8	3658.8	727	1753.2	1848.2	3506.4	3696.4	820	1771.8	1866.8	3543.6	3733.6
540	1715.8	1810.8	3431.6	3621.6	634	1734.6	1829.6	3469.2	3659.2	728	1753.4	1848.4	3506.8	3696.8	821	1772.0	1867.0	3544.0	3734.0
541	1716.0	1811.0	3432.0	3622.0	635	1734.8	1829.8	3469.6	3659.6	729	1753.6	1848.6	3507.2	3697.2	822	1772.2	1867.2	3544.4	3734.4
542	1716.2	1811.2	3432.4	3622.4	636	1735.0	1830.0	3470.0	3660.0	730	1753.8	1848.8	3507.6	3697.6	823	1772.4	1867.4	3544.8	3734.8
543	1716.4	1811.4	3432.8	3622.8	637	1735.2	1830.2	3470.4	3660.4	731	1754.0	1849.0	3508.0	3698.0	824	1772.6	1867.6	3545.2	3735.2
544	1716.6	1811.6	3433.2	3623.2	638	1735.4	1830.4	3470.8	3660.8	732	1754.2	1849.2	3508.4	3698.4	825	1772.8	1867.8	3545.6	3735.6
545	1716.8	1811.8	3433.6	3623.6	639	1735.6	1830.6	3471.2	3661.2	733	1754.4	1849.4	3508.8	3698.8	826	1773.0	1868.0	3546.0	3736.0
546	1717.0	1812.0	3434.0	3624.0	640	1735.8	1830.8	3471.6	3661.6	734	1754.6	1849.6	3509.2	3699.2	827	1773.2	1868.2	3546.4	3736.4
547	1717.2	1812.2	3434.4	3624.4	641	1736.0	1831.0	3472.0	3662.0	735	1754.8	1849.8	3509.6	3699.6	828	1773.4	1868.4	3546.8	3736.8
548	1717.4	1812.4	3434.8	3624.8	642	1736.2	1831.2	3472.4	3662.4	736	1755.0	1850.0	3510.0	3700.0	829	1773.6	1868.6	3547.2	3737.2
549	1717.6	1812.6	3435.2	3625.2	643	1736.4	1831.4	3472.8	3662.8	737	1755.2	1850.2	3510.4	3700.4	830	1773.8	1868.8	3547.6	3737.6
550	1717.8	1812.8	3435.6	3625.6	644	1736.6	1831.6	3473.2	3663.2	738	1755.4	1850.4	3510.8	3700.8	831	1774.0	1869.0	3548.0	3738.0
551	1718.0	1813.0	3436.0	3626.0	645	1736.8	1831.8	3473.6	3663.6	739	1755.6	1850.6	3511.2	3701.2	832	1774.2	1869.2	3548.4	3738.4
552	1718.2	1813.2	3436.4	3626.4	646	1737.0	1832.0	3474.0	3664.0	740	1755.8	1850.8	3511.6	3701.6	833	1774.4	1869.4	3548.8	3738.8
553	1718.4	1813.4	3436.8	3626.8	647	1737.2	1832.2	3474.4	3664.4	741	1756.0	1851.0	3512.0	3702.0	834	1774.6	1869.6	3549.2	3739.2
554	1718.6	1813.6	3437.2	3627.2	648	1737.4	1832.4	3474.8	3664.8	742	1756.2	1851.2	3512.4	3702.4	835	1774.8	1869.8	3549.6	3739.6
555	1718.8	1813.8	3437.6	3627.6	649	1737.6	1832.6	3475.2	3665.2	743	1756.4	1851.4	3512.8	3702.8	836	1775.0	1870.0	3550.0	3740.0
556	1719.0	1814.0	3438.0	3628.0	650	1737.8	1832.8	3475.6	3665.6	744	1756.6	1851.6	3513.2	3703.2	837	1775.2	1870.2	3550.4	3740.4
557	1719.2	1814.2	3438.4	3628.4	651	1738.0	1833.0	3476.0	3666.0	745	1756.8	1851.8	3513.6	3703.6	838	1775.4	1870.4	3550.8	3740.8
558	1719.4	1814.4	3438.8	3628.8	652	1738.2	1833.2	3476.4	3666.4	746	1757.0	1852.0	3514.0	3704.0	839	1775.6	1870.6	3551.2	3741.2
559	1719.6	1814.6	3439.2	3629.2	653	1738.4	1833.4	3476.8	3666.8	747	1757.2	1852.2	3514.4	3704.4	840	1775.8	1870.8	3551.6	3741.6
560	1719.8	1814.8	3439.6	3629.6	654	1738.6	1833.6	3477.2	3667.2	748	1757.4	1852.4	3514.8	3704.8	841	1776.0	1871.0	3552.0	3742.0
561	1720.0	1815.0	3440.0	3630.0	655	1738.8	1833.8	3477.6	3667.6	749	1757.6	1852.6	3515.2	3705.2	842	1776.2	1871.2	3552.4	3742.4
562	1720.2	1815.2	3440.4	3630.4	656	1739.0	1834.0	3478.0	3668.0	750	1757.8	1852.8	3515.6	3705.6	843	1776.4	1871.4	3552.8	3742.8
563	1720.4	1815.4	3440.8	3630.8	657	1739.2	1834.2	3478.4	3668.4	751	1758.0	1853.0	3516.0	3706.0	844	1776.6	1871.6	3553.2	3743.2
564	1720.6	1815.6	3441.2	3631.2	658	1739.4	1834.4	3478.8	3668.8	752	1758.2	1853.2	3516.4	3706.4	845	1776.8	1871.8	3553.6	3743.6
565	1720.8	1815.8	3441.6	3631.6	659	1739.6	1834.6	3479.2	3669.2	753	1758.4	1853.4	3516.8	3706.8	846	1777.0	1872.0	3554.0	3744.0
566	1721.0	1816.0	3442.0	3632.0	660	1739.8	1834.8	3479.6	3669.6	754	1758.6	1853.6	3517.2	3707.2	847	1777.2	1872.2	3554.4	3744.4
567	1721.2	1816.2	3442.4	3632.4	661	1740.0	1835.0	3480.0	3670.0	755	1758.8	1853.8	3517.6	3707.6	848	1777.4	1872.4	3554.8	3744.8
568	1721.4	1816.4	3442.8	3632.8	662	1740.2	1835.2	3480.4	3670.4	756	1759.0	1854.0	3518.0	3708.0	849	1777.6	1872.6	3555.2	3745.2
569	1721.6	1816.6	3443.2	3633.2	663	1740.4	1835.4	3480.8	3670.8	757	1759.2	1854.2	3518.4	3708.4	850	1777.8	1872.8	3555.6	3745.6
570	1721.8	1816.8	3443.6	3633.6	664	1740.6	1835.6	3481.2	3671.2	758	1759.4	1854.4	3518.8	3708.8	851	1778.0	1873.0	3556.0	3746.0
571	1722.0	1817.0	3444.0	3634.0	665	1740.8	1835.8	3481.6	3671.6	759	1759.6	1854.6	3519.2	3709.2	852	1778.2	1873.2	3556.4	3746.4
572	1722.2	1817.2	3444.4	3634.4	666	1741.0	1836.0	3482.0	3672.0	760	1759.8	1854.8	3519.6	3709.6	853	1778.4	1873.4	3556.8	3746.8
573	1722.4	1817.4	3444.8	3634.8	667	1741.2	1836.2	3482.4	3672.4	761	1760.0	1855.0	3520.0	3710.0	854	1778.6	1873.6	3557.2	3747.2
574	1722.6	1817.6	3445.2	3635.2	668	1741.4	1836.4	3482.8	3672.8	762	1760.2	1855.2	3520.4	3710.4	855	1778.8	1873.8	3557.6	3747.6
575	1722.8	1817.8	3445.6	3635.6	669	1741.6	1836.6	3483.2	3673.2	763	1760.4	1855.4	3520.8	3710.8	856	1779.0	1874.0	3558.0	3748.0
576	1723.0	1818.0	3446.0	3636.0	670	1741.8	1836.8	3483.6	3673.6	764	1760.6	1855.6	3521.2	3711.2	857	1779.2	1874.2	3558.4	3748.4
577	1723.2	1818.2	3446.4	3636.4	671	1742.0	1837.0	3484.0	3674.0	765	1760.8	1855.8	3521.6	3711.6	858	1779.4	1874.4	3558.8	3748.8
578	1723.4	1818.4	3446.8	3636.8	672	1742.2	1837.2	3484.4	3674.4	766	1761.0	1856.0	3522.0	3712.0	859	1779.6	1874.6	3559.2	3749.2
579	1723.6	1818.6	3447.2	3637.2	673	1742.4	1837.4	3484.8	3674.8	767	1761.2	1856.2	3522.4	3712.4	860	1779.8	1874.8	3559.6	3749.6
580	1723.8	1818.8	3447.6	3637.6	674	1742.6	1837.6	3485.2	3675.2	768	1761.4	1856.4	3522.8	3712.8	861	1780.0	1875.0	3560.0	3750.0
581	1724.0	1819.0	3448.0	3638.0	675	1742.8	1837.8	3485.6	3675.6	769	1761.6	1856.6	3523.2	3713.2	862	1780.2	1875.2	3560.4	3750.4
582	1724.2	1819.2	3448.4	3638.4	676	1743.0	1838.0	3486.0	3676.0	770	1761.8	1856.8	3523.6	3713.6	863	1780.4	1875.4	3560.8	3750.8
583	1724.4	1819.4	3448.8	3638.8	677	1743.2	1838.2	3486.4	3676.4	771	1762.0	1857.0	3524.0	3714.0	864	1780.6	1875.6	3561.2	3751.2
584	1724.6	1819.6	3449.2	3639.2	678	1743.4	1838.4	3486.8	3676.8	772	1762.2	1857.2	3524.4	3714.4	865	1780.8	1875.8	3561.6	3751.6
585	1724.8	1819.8	3449.6	3639.6	679	1743.6	1838.6	3487.2	3677.2	773	1762.4	1857.4	3524.8	3714.8	866	1781.0	1876.0	3562.0	3752.0
586	1725.0	1820.0	3450.0	3640.0	680	1743.8	1838.8	3487.6	3677.6	774	1762.6	1857.6	3525.2	3715.2	867	1781.2	1876.2	3562.4	3752.4
587	1725.2	1820.2	3450.4	3640.4	681	1744.0	1839.0	3488.0	3678.0	775	1762.8	1857.8	3525.6	3715.6	868	1781.4	1876.4	3562.8	3752.8
588	1725.4	1820.4	3450.8	3640.8	682	1744.2	1839.2	3488.4	3678.4	776	1763.0	1858.0	3526.0	3716.0	869	1781.6	1876.6	3563.2	3753.2
589	1725.6	1820.6	3451.2	3641.2	683	1744.4	1839.4	3488.8	3678.8	777	1763.2	1858.2	3526.4	3716.4	870	1781.8	1876.8	3563.6	3753.6
590	1725.8	1820.8	3451.6	3641.6	684	1744.6	1839.6	3489.2	3679.2	778	1763.4	1858.4	3526.8	3716.8	871	1782.0	1877.0	3564.0	3754.0
591	1726.0	1821.0	3452.0	3642.0	685	1744.8	1839.8	3489.6	3679.6	779	1763.6	1858.6	3527.2	3717.2	872	1782.2	1877.2	3564.4	3754.4
592	1726.2	1821.2	3452.4	3642.4	686	1745.0	1840.0	3490.0	3680.0	780	1763.8	1858.8	3527.6	3717.6	873	1782.4	1877.4	3564.8	3754.8
593	1726.4	1821.4	3452.8	3642.8	687	1745.2	1840.2	3490.4	3680.4	781	1764.0	1859.0	3528.0	3718.0	874	1782.6	1877.6	3565.2	3755.2
594	1726.6	1821.6	3453.2	3643.2	688	1745.4	1840.4	3490.8	3680.8	782	1764.2	1859.2	3528.4	3718.4	875	1782.8	1877.8	3565.6	3755.6
595	1726.8	1821.8	3453.6	3643.6	689	1745.6	1840.6	3491.2	3681.2	783	1764.4	1859.4	3528.8	3718.8	876	1783.0	1878.0	3566.0	3756.0
596	1727.0	1822.0	3454.0	3644.0	690	1745.8	1840.8	3491.6	3681.6	784	1764.6	1859.6	3529.2	3719.2	877	1783.2	1878.2	3566.4	3756.4
597	1727.2	1822.2	3454.4	3644.4	691	1746.0	1841.0	3492.0	3682.0	785	1764.8	1859.8	3529.6	3719.6	878	1783.4	1878.4	3566.8	3756.8
598	1727.4	1822.4	3454.8	3644.8	692	1746.2	1841.2	3492.4	3682.4	786	1765.0	1860.0	3530.0	3720.0	879	1783.6	1878.6	3567.2	3757.2
599	1727.6	1822.6	3455.2	3645.2	693	1746.4	1841.4	3492.8	3682.8	787	1765.2	1860.2	3530.4	3720.4	880	1783.8	1878.8	3567.6	3757.6
600	1727.8	1822.8	3455.6	3645.6	694	1746.6	1841.6	3493.2	3683.2	788	1765.4	1860.4	3530.8	3720.8	881	1784.0	1879.0	3568.0	3758.0
601	1728.0	1823.0	3456.0	3646.0	695	1746.8	1841.8	3493.6	3683.6	789	1765.6	1860.6	3531.2	3721.2	882	1784.2	1879.2	3568.4	3758.4
602	1728.2	1823.2	3456.4	3646.4	696	1747.0	1842.0	3494.0	3684.0	790	1765.8	1860.8	3531.6	3721.6	883	1784.4	1879.4	3568.8	3758.8
603	1728.4	1823.4	3456.8	3646.8	697	1747.2	1842.2	3494.4	3684.4	791	1766.0	1861.0	3532.0	3722.0	884	1784.6	1879.6	3569.2	3759.2
604	1728.6	1823.6	3457.2	3647.2	698	1747.4	1842.4	3494.8	3684.8	792	1766.2	1861.2	3532.4	3722.4	885	1784.8	1879.8	3569.6	3759.6
605	1728.8	1823.8	3457.6	3647.6	699	1747.6	1842.6	3495.2	3685.2										

GSM1900 frequencies

CH	TX	RX	VCO TX	VCO RX	CH	TX	RX	VCO TX	VCO RX	CH	TX	RX	VCO TX	VCO RX	CH	TX	RX	VCO TX	VCO RX
512	1850,2	1930,2	3700,4	3860,4	606	1869,0	1949,0	3738,0	3898,0	700	1887,8	1967,8	3775,6	3935,6	794	1906,6	1986,6	3813,2	3973,2
513	1850,4	1930,4	3700,8	3860,8	607	1869,2	1949,2	3738,4	3898,4	701	1888,0	1968,0	3776,0	3936,0	795	1906,8	1986,8	3813,6	3973,6
514	1850,6	1930,6	3701,2	3861,2	608	1869,4	1949,4	3738,8	3898,8	702	1888,2	1968,2	3776,4	3936,4	796	1907,0	1987,0	3814,0	3974,0
515	1850,8	1930,8	3701,6	3861,6	609	1869,6	1949,6	3739,2	3899,2	703	1888,4	1968,4	3776,8	3936,8	797	1907,2	1987,2	3814,4	3974,4
516	1851,0	1931,0	3702,0	3862,0	610	1869,8	1949,8	3739,6	3899,6	704	1888,6	1968,6	3777,2	3937,2	798	1907,4	1987,4	3814,8	3974,8
517	1851,2	1931,2	3702,4	3862,4	611	1870,0	1950,0	3740,0	3900,0	705	1888,8	1968,8	3777,6	3937,6	799	1907,6	1987,6	3815,2	3975,2
518	1851,4	1931,4	3702,8	3862,8	612	1870,2	1950,2	3740,4	3900,4	706	1889,0	1969,0	3778,0	3938,0	800	1907,8	1987,8	3815,6	3975,6
519	1851,6	1931,6	3703,2	3863,2	613	1870,4	1950,4	3740,8	3900,8	707	1889,2	1969,2	3778,4	3938,4	801	1908,0	1988,0	3816,0	3976,0
520	1851,8	1931,8	3703,6	3863,6	614	1870,6	1950,6	3741,2	3901,2	708	1889,4	1969,4	3778,8	3938,8	802	1908,2	1988,2	3816,4	3976,4
521	1852,0	1932,0	3704,0	3864,0	615	1870,8	1950,8	3741,6	3901,6	709	1889,6	1969,6	3779,2	3939,2	803	1908,4	1988,4	3816,8	3976,8
522	1852,2	1932,2	3704,4	3864,4	616	1871,0	1951,0	3742,0	3902,0	710	1889,8	1969,8	3779,6	3939,6	804	1908,6	1988,6	3817,2	3977,2
523	1852,4	1932,4	3704,8	3864,8	617	1871,2	1951,2	3742,4	3902,4	711	1890,0	1970,0	3780,0	3940,0	805	1908,8	1988,8	3817,6	3977,6
524	1852,6	1932,6	3705,2	3865,2	618	1871,4	1951,4	3742,8	3902,8	712	1890,2	1970,2	3780,4	3940,4	806	1909,0	1989,0	3818,0	3978,0
525	1852,8	1932,8	3705,6	3865,6	619	1871,6	1951,6	3743,2	3903,2	713	1890,4	1970,4	3780,8	3940,8	807	1909,2	1989,2	3818,4	3978,4
526	1853,0	1933,0	3706,0	3866,0	620	1871,8	1951,8	3743,6	3903,6	714	1890,6	1970,6	3781,2	3941,2	808	1909,4	1989,4	3818,8	3978,8
527	1853,2	1933,2	3706,4	3866,4	621	1872,0	1952,0	3744,0	3904,0	715	1890,8	1970,8	3781,6	3941,6	809	1909,6	1989,6	3819,2	3979,2
528	1853,4	1933,4	3706,8	3866,8	622	1872,2	1952,2	3744,4	3904,4	716	1891,0	1971,0	3782,0	3942,0	810	1909,8	1989,8	3819,6	3979,6
529	1853,6	1933,6	3707,2	3867,2	623	1872,4	1952,4	3744,8	3904,8	717	1891,2	1971,2	3782,4	3942,4					
530	1853,8	1933,8	3707,6	3867,6	624	1872,6	1952,6	3745,2	3905,2	718	1891,4	1971,4	3782,8	3942,8					
531	1854,0	1934,0	3708,0	3868,0	625	1872,8	1952,8	3745,6	3905,6	719	1891,6	1971,6	3783,2	3943,2					
532	1854,2	1934,2	3708,4	3868,4	626	1873,0	1953,0	3746,0	3906,0	720	1891,8	1971,8	3783,6	3943,6					
533	1854,4	1934,4	3708,8	3868,8	627	1873,2	1953,2	3746,4	3906,4	721	1892,0	1972,0	3784,0	3944,0					
534	1854,6	1934,6	3709,2	3869,2	628	1873,4	1953,4	3746,8	3906,8	722	1892,2	1972,2	3784,4	3944,4					
535	1854,8	1934,8	3709,6	3869,6	629	1873,6	1953,6	3747,2	3907,2	723	1892,4	1972,4	3784,8	3944,8					
536	1855,0	1935,0	3710,0	3870,0	630	1873,8	1953,8	3747,6	3907,6	724	1892,6	1972,6	3785,2	3945,2					
537	1855,2	1935,2	3710,4	3870,4	631	1874,0	1954,0	3748,0	3908,0	725	1892,8	1972,8	3785,6	3945,6					
538	1855,4	1935,4	3710,8	3870,8	632	1874,2	1954,2	3748,4	3908,4	726	1893,0	1973,0	3786,0	3946,0					
539	1855,6	1935,6	3711,2	3871,2	633	1874,4	1954,4	3748,8	3908,8	727	1893,2	1973,2	3786,4	3946,4					
540	1855,8	1935,8	3711,6	3871,6	634	1874,6	1954,6	3749,2	3909,2	728	1893,4	1973,4	3786,8	3946,8					
541	1856,0	1936,0	3712,0	3872,0	635	1874,8	1954,8	3749,6	3909,6	729	1893,6	1973,6	3787,2	3947,2					
542	1856,2	1936,2	3712,4	3872,4	636	1875,0	1955,0	3750,0	3910,0	730	1893,8	1973,8	3787,6	3947,6					
543	1856,4	1936,4	3712,8	3872,8	637	1875,2	1955,2	3750,4	3910,4	731	1894,0	1974,0	3788,0	3948,0					
544	1856,6	1936,6	3713,2	3873,2	638	1875,4	1955,4	3750,8	3910,8	732	1894,2	1974,2	3788,4	3948,4					
545	1856,8	1936,8	3713,6	3873,6	639	1875,6	1955,6	3751,2	3911,2	733	1894,4	1974,4	3788,8	3948,8					
546	1857,0	1937,0	3714,0	3874,0	640	1875,8	1955,8	3751,6	3911,6	734	1894,6	1974,6	3789,2	3949,2					
547	1857,2	1937,2	3714,4	3874,4	641	1876,0	1956,0	3752,0	3912,0	735	1894,8	1974,8	3789,6	3949,6					
548	1857,4	1937,4	3714,8	3874,8	642	1876,2	1956,2	3752,4	3912,4	736	1895,0	1975,0	3790,0	3950,0					
549	1857,6	1937,6	3715,2	3875,2	643	1876,4	1956,4	3752,8	3912,8	737	1895,2	1975,2	3790,4	3950,4					
550	1857,8	1937,8	3715,6	3875,6	644	1876,6	1956,6	3753,2	3913,2	738	1895,4	1975,4	3790,8	3950,8					
551	1858,0	1938,0	3716,0	3876,0	645	1876,8	1956,8	3753,6	3913,6	739	1895,6	1975,6	3791,2	3951,2					
552	1858,2	1938,2	3716,4	3876,4	646	1877,0	1957,0	3754,0	3914,0	740	1895,8	1975,8	3791,6	3951,6					
553	1858,4	1938,4	3716,8	3876,8	647	1877,2	1957,2	3754,4	3914,4	741	1896,0	1976,0	3792,0	3952,0					
554	1858,6	1938,6	3717,2	3877,2	648	1877,4	1957,4	3754,8	3914,8	742	1896,2	1976,2	3792,4	3952,4					
555	1858,8	1938,8	3717,6	3877,6	649	1877,6	1957,6	3755,2	3915,2	743	1896,4	1976,4	3792,8	3952,8					
556	1859,0	1939,0	3718,0	3878,0	650	1877,8	1957,8	3755,6	3915,6	744	1896,6	1976,6	3793,2	3953,2					
557	1859,2	1939,2	3718,4	3878,4	651	1878,0	1958,0	3756,0	3916,0	745	1896,8	1976,8	3793,6	3953,6					
558	1859,4	1939,4	3718,8	3878,8	652	1878,2	1958,2	3756,4	3916,4	746	1897,0	1977,0	3794,0	3954,0					
559	1859,6	1939,6	3719,2	3879,2	653	1878,4	1958,4	3756,8	3916,8	747	1897,2	1977,2	3794,4	3954,4					
560	1859,8	1939,8	3719,6	3879,6	654	1878,6	1958,6	3757,2	3917,2	748	1897,4	1977,4	3794,8	3954,8					
561	1860,0	1940,0	3720,0	3880,0	655	1878,8	1958,8	3757,6	3917,6	749	1897,6	1977,6	3795,2	3955,2					
562	1860,2	1940,2	3720,4	3880,4	656	1879,0	1959,0	3758,0	3918,0	750	1897,8	1977,8	3795,6	3955,6					
563	1860,4	1940,4	3720,8	3880,8	657	1879,2	1959,2	3758,4	3918,4	751	1898,0	1978,0	3796,0	3956,0					
564	1860,6	1940,6	3721,2	3881,2	658	1879,4	1959,4	3758,8	3918,8	752	1898,2	1978,2	3796,4	3956,4					
565	1860,8	1940,8	3721,6	3881,6	659	1879,6	1959,6	3759,2	3919,2	753	1898,4	1978,4	3796,8	3956,8					
566	1861,0	1941,0	3722,0	3882,0	660	1879,8	1959,8	3759,6	3919,6	754	1898,6	1978,6	3797,2	3957,2					
567	1861,2	1941,2	3722,4	3882,4	661	1880,0	1960,0	3760,0	3920,0	755	1898,8	1978,8	3797,6	3957,6					
568	1861,4	1941,4	3722,8	3882,8	662	1880,2	1960,2	3760,4	3920,4	756	1899,0	1979,0	3798,0	3958,0					
569	1861,6	1941,6	3723,2	3883,2	663	1880,4	1960,4	3760,8	3920,8	757	1899,2	1979,2	3798,4	3958,4					
570	1861,8	1941,8	3723,6	3883,6	664	1880,6	1960,6	3761,2	3921,2	758	1899,4	1979,4	3798,8	3958,8					
571	1862,0	1942,0	3724,0	3884,0	665	1880,8	1960,8	3761,6	3921,6	759	1899,6	1979,6	3799,2	3959,2					
572	1862,2	1942,2	3724,4	3884,4	666	1881,0	1961,0	3762,0	3922,0	760	1899,8	1979,8	3799,6	3959,6					
573	1862,4	1942,4	3724,8	3884,8	667	1881,2	1961,2	3762,4	3922,4	761	1900,0	1980,0	3800,0	3960,0					
574	1862,6	1942,6	3725,2	3885,2	668	1881,4	1961,4	3762,8	3922,8	762	1900,2	1980,2	3800,4	3960,4					
575	1862,8	1942,8	3725,6	3885,6	669	1881,6	1961,6	3763,2	3923,2	763	1900,4	1980,4	3800,8	3960,8					
576	1863,0	1943,0	3726,0	3886,0	670	1881,8	1961,8	3763,6	3923,6	764	1900,6	1980,6	3801,2	3961,2					
577	1863,2	1943,2	3726,4	3886,4	671	1882,0	1962,0	3764,0	3924,0	765	1900,8	1980,8	3801,6	3961,6					
578	1863,4	1943,4	3726,8	3886,8	672	1882,2	1962,2	3764,4	3924,4	766	1901,0	1981,0	3802,0	3962,0					
579	1863,6	1943,6	3727,2	3887,2	673	1882,4	1962,4	3764,8	3924,8	767	1901,2	1981,2	3802,4	3962,4					
580	1863,8	1943,8	3727,6	3887,6	674	1882,6	1962,6	3765,2	3925,2	768	1901,4	1981,4	3802,8	3962,8					
581	1864,0	1944,0	3728,0	3888,0	675	1882,8	1962,8	3765,6	3925,6	769	1901,6	1981,6	3803,2	3963,2					
582	1864,2	1944,2	3728,4	3888,4	676	1883,0	1963,0	3766,0	3926,0	770	1901,8	1981,8	3803,6	3963,6					
583	1864,4	1944,4	3728,8	3888,8	677	1883,2	1963,2	3766,4	3926,4	771	1902,0	1982,0	3804,0	3964,0					
584	1864,6	1944,6	3729,2	3889,2	678	1883,4	1963,4	3766,8	3926,8	772	1902,2	1982,2	3804,4	3964,4					
585	1864,8	1944,8	3729,6	3889,6	679	1883,6	1963,6	3767,2	3927,2	773	1902,4	1982,4	3804,8	3964,8					
586	1865,0	1945,0	3730,0	3890,0	680	1883,8	1963,8	3767,6	3927,6	774	1902,6	1982,6	3805,2	3965,2					
587	1865,2	1945,2	3730,4	3890,4	681	1884,0	1964,0	3768,0	3928,0	775	1902,8	1982,8	3805,6	3965,6					
588	1865,4	1945,4	3730,8	3890,8	682	1884,2	1964,2	3768,4	3928,4	776	1903,0	1983,0	3806,0	3966,0					
589	1865,6	1945,6	3731,2	3891,2	683	1884,4	1964,4	3768,8	3928,8	777	1903,2	1983,2	3806,4	3966,4					
590	1865,8	1945,8	3731,6	3891,6	684	1884,6	1964,6	3769,2	3929,2	778	1903,4	1983,4	3806,8	3966,8					
591	1866,0	1946,0	3732,0	3892,0	685	1884,8	1964,8	3769,6	3929,6	779	1903,6	1983,6	3807,2	3967,2					
592	1866,2	1946,2	3732,4	3892,4	686	1885,0	1965,0	3770,0	3930,0	780	1903,8	1983,8	3807,6	3967,6					
593	1866,4	1946,4	3732,8	3892,8	687	1885,2	1965,2	3770,4	3930,4	781	1904,0	1984,0	3808,0	3968,0					
594	1866,6	1946,6	3733,2	3893,2	688	1885,4	1965,4	3770,8	3930,8	782	1904,2	1984,2	3808,4	3968,4					
595	1866,8	1946,8	3733,6	3893,6	689	1885,6	1965,6	3771,2	3931,2	783	1904,4	1984,4	3808,8	3968,8					
596	1867,0	1947,0	3734,0	3894,0	690	1885,8	1965,8	3771,6	3931,6	784	1904,6	1984,6	3809,2	3969,2					
597	1867,2	1947,2	3734,4	3894,4	691	1886,0	1966,0	3772,0	3932,0	785	1904,8	1984,8	3809,6	3969,6					
598	1867,4	1947,4	3734,8	3894,8	692	1886,2	1966,2	3772,4	3932,4	786	1905,0	1985,0	3810,0	3970,0					
599	1867,6	1947,6	3735,2	3895,2	693	1886,4	1966,4	3772,8	3932,8	787	1905,2	1985,2	3810,4	3970,4					
600	1867,8	1947,8	3735,6	3895,6	694	1886,6	1966,6	3773,2	3933,2	788	1905,4	1985,4	3810,8	3970,8					
601	1868,0	1948,0	3736,0	3896,0	695	1886,8	1966,8	3773,6	3933,6	789	1905,6	1985,6	3811,2	3971,2					
602	1868,2	1948,2	3736,4	3896,4	696	1887,0	1967,0	3774,0	3934,0	790	1905,8	1985,8	3811,6	3971,6					
603	1868,4	1948,4	3736,8	3896,8	697	1887,2	1967,2	3774,4	3934,4	791	1906,0	1986,0	3812,0	3972,0					
604	1868,6	1948,6	3737,2	3897,2	698	1887,4	1967,4	3774,8	3934,8	792	1906,2	1986,2	3812,4	3972,4					
605	1868,8	1948,8	3737,6	3897,6	699	1887,6	1967,6	3775,2	3935,2	793	1906,4	1986,4	3812,8	3972,8					

WCDMA 2100 Rx frequencies

Ch	RX	VCO RX	Ch	RX	VCO RX	Ch	RX	VCO RX	Ch	RX	VCO RX	Ch	RX	VCO RX
10562	2112.4	4224.8	10625	2125	4250	10688	2137.6	4275.2	10751	2150.2	4300.4	10814	2162.8	4325.6
10563	2112.6	4225.2	10626	2125.2	4250.4	10689	2137.8	4275.6	10752	2150.4	4300.8	10815	2163	4326
10564	2112.8	4225.6	10627	2125.4	4250.8	10690	2138	4276	10753	2150.6	4301.2	10816	2163.2	4326.4
10565	2113	4226	10628	2125.6	4251.2	10691	2138.2	4276.4	10754	2150.8	4301.6	10817	2163.4	4326.8
10566	2113.2	4226.4	10629	2125.8	4251.6	10692	2138.4	4276.8	10755	2151	4302	10818	2163.6	4327.2
10567	2113.4	4226.8	10630	2126	4252	10693	2138.6	4277.2	10756	2151.2	4302.4	10819	2163.8	4327.6
10568	2113.6	4227.2	10631	2126.2	4252.4	10694	2138.8	4277.6	10757	2151.4	4302.8	10820	2164	4328
10569	2113.8	4227.6	10632	2126.4	4252.8	10695	2139	4278	10758	2151.6	4303.2	10821	2164.2	4328.4
10570	2114	4228	10633	2126.6	4253.2	10696	2139.2	4278.4	10759	2151.8	4303.6	10822	2164.4	4328.8
10571	2114.2	4228.4	10634	2126.8	4253.6	10697	2139.4	4278.8	10760	2152	4304	10823	2164.6	4329.2
10572	2114.4	4228.8	10635	2127	4254	10698	2139.6	4279.2	10761	2152.2	4304.4	10824	2164.8	4329.6
10573	2114.6	4229.2	10636	2127.2	4254.4	10699	2139.8	4279.6	10762	2152.4	4304.8	10825	2165	4330
10574	2114.8	4229.6	10637	2127.4	4254.8	10700	2140	4280	10763	2152.6	4305.2	10826	2165.2	4330.4
10575	2115	4230	10638	2127.6	4255.2	10701	2140.2	4280.4	10764	2152.8	4305.6	10827	2165.4	4330.8
10576	2115.2	4230.4	10639	2127.8	4255.6	10702	2140.4	4280.8	10765	2153	4306	10828	2165.6	4331.2
10577	2115.4	4230.8	10640	2128	4256	10703	2140.6	4281.2	10766	2153.2	4306.4	10829	2165.8	4331.6
10578	2115.6	4231.2	10641	2128.2	4256.4	10704	2140.8	4281.6	10767	2153.4	4306.8	10830	2166	4332
10579	2115.8	4231.6	10642	2128.4	4256.8	10705	2141	4282	10768	2153.6	4307.2	10831	2166.2	4332.4
10580	2116	4232	10643	2128.6	4257.2	10706	2141.2	4282.4	10769	2153.8	4307.6	10832	2166.4	4332.8
10581	2116.2	4232.4	10644	2128.8	4257.6	10707	2141.4	4282.8	10770	2154	4308	10833	2166.6	4333.2
10582	2116.4	4232.8	10645	2129	4258	10708	2141.6	4283.2	10771	2154.2	4308.4	10834	2166.8	4333.6
10583	2116.6	4233.2	10646	2129.2	4258.4	10709	2141.8	4283.6	10772	2154.4	4308.8	10835	2167	4334
10584	2116.8	4233.6	10647	2129.4	4258.8	10710	2142	4284	10773	2154.6	4309.2	10836	2167.2	4334.4
10585	2117	4234	10648	2129.6	4259.2	10711	2142.2	4284.4	10774	2154.8	4309.6	10837	2167.4	4334.8
10586	2117.2	4234.4	10649	2129.8	4259.6	10712	2142.4	4284.8	10775	2155	4310	10838	2167.6	4335.2
10587	2117.4	4234.8	10650	2130	4260	10713	2142.6	4285.2	10776	2155.2	4310.4			
10588	2117.6	4235.2	10651	2130.2	4260.4	10714	2142.8	4285.6	10777	2155.4	4310.8			
10589	2117.8	4235.6	10652	2130.4	4260.8	10715	2143	4286	10778	2155.6	4311.2			
10590	2118	4236	10653	2130.6	4261.2	10716	2143.2	4286.4	10779	2155.8	4311.6			
10591	2118.2	4236.4	10654	2130.8	4261.6	10717	2143.4	4286.8	10780	2156	4312			
10592	2118.4	4236.8	10655	2131	4262	10718	2143.6	4287.2	10781	2156.2	4312.4			
10593	2118.6	4237.2	10656	2131.2	4262.4	10719	2143.8	4287.6	10782	2156.4	4312.8			
10594	2118.8	4237.6	10657	2131.4	4262.8	10720	2144	4288	10783	2156.6	4313.2			
10595	2119	4238	10658	2131.6	4263.2	10721	2144.2	4288.4	10784	2156.8	4313.6			
10596	2119.2	4238.4	10659	2131.8	4263.6	10722	2144.4	4288.8	10785	2157	4314			
10597	2119.4	4238.8	10660	2132	4264	10723	2144.6	4289.2	10786	2157.2	4314.4			
10598	2119.6	4239.2	10661	2132.2	4264.4	10724	2144.8	4289.6	10787	2157.4	4314.8			
10599	2119.8	4239.6	10662	2132.4	4264.8	10725	2145	4290	10788	2157.6	4315.2			
10600	2120	4240	10663	2132.6	4265.2	10726	2145.2	4290.4	10789	2157.8	4315.6			
10601	2120.2	4240.4	10664	2132.8	4265.6	10727	2145.4	4290.8	10790	2158	4316			
10602	2120.4	4240.8	10665	2133	4266	10728	2145.6	4291.2	10791	2158.2	4316.4			
10603	2120.6	4241.2	10666	2133.2	4266.4	10729	2145.8	4291.6	10792	2158.4	4316.8			
10604	2120.8	4241.6	10667	2133.4	4266.8	10730	2146	4292	10793	2158.6	4317.2			
10605	2121	4242	10668	2133.6	4267.2	10731	2146.2	4292.4	10794	2158.8	4317.6			
10606	2121.2	4242.4	10669	2133.8	4267.6	10732	2146.4	4292.8	10795	2159	4318			
10607	2121.4	4242.8	10670	2134	4268	10733	2146.6	4293.2	10796	2159.2	4318.4			
10608	2121.6	4243.2	10671	2134.2	4268.4	10734	2146.8	4293.6	10797	2159.4	4318.8			
10609	2121.8	4243.6	10672	2134.4	4268.8	10735	2147	4294	10798	2159.6	4319.2			
10610	2122	4244	10673	2134.6	4269.2	10736	2147.2	4294.4	10799	2159.8	4319.6			
10611	2122.2	4244.4	10674	2134.8	4269.6	10737	2147.4	4294.8	10800	2160	4320			
10612	2122.4	4244.8	10675	2135	4270	10738	2147.6	4295.2	10801	2160.2	4320.4			
10613	2122.6	4245.2	10676	2135.2	4270.4	10739	2147.8	4295.6	10802	2160.4	4320.8			
10614	2122.8	4245.6	10677	2135.4	4270.8	10740	2148	4296	10803	2160.6	4321.2			
10615	2123	4246	10678	2135.6	4271.2	10741	2148.2	4296.4	10804	2160.8	4321.6			
10616	2123.2	4246.4	10679	2135.8	4271.6	10742	2148.4	4296.8	10805	2161	4322			
10617	2123.4	4246.8	10680	2136	4272	10743	2148.6	4297.2	10806	2161.2	4322.4			
10618	2123.6	4247.2	10681	2136.2	4272.4	10744	2148.8	4297.6	10807	2161.4	4322.8			
10619	2123.8	4247.6	10682	2136.4	4272.8	10745	2149	4298	10808	2161.6	4323.2			
10620	2124	4248	10683	2136.6	4273.2	10746	2149.2	4298.4	10809	2161.8	4323.6			
10621	2124.2	4248.4	10684	2136.8	4273.6	10747	2149.4	4298.8	10810	2162	4324			
10622	2124.4	4248.8	10685	2137	4274	10748	2149.6	4299.2	10811	2162.2	4324.4			
10623	2124.6	4249.2	10686	2137.2	4274.4	10749	2149.8	4299.6	10812	2162.4	4324.8			
10624	2124.8	4249.6	10687	2137.4	4274.8	10750	2150	4300	10813	2162.6	4325.2			

WCDMA 2100 Tx frequencies

Ch	Tx	VCO Tx	Ch	Tx	VCO Tx	Ch	Tx	VCO Tx	Ch	Tx	VCO Tx	Ch	Tx	VCO Tx
9612	1922.4	3844.8	9671	1934.2	3868.4	9730	1946	3892	9789	1957.8	3915.6	9848	1969.6	3939.2
9613	1922.6	3845.2	9672	1934.4	3868.8	9731	1946.2	3892.4	9790	1958	3916	9849	1969.8	3939.6
9614	1922.8	3845.6	9673	1934.6	3869.2	9732	1946.4	3892.8	9791	1958.2	3916.4	9850	1970	3940
9615	1923	3846	9674	1934.8	3869.6	9733	1946.6	3893.2	9792	1958.4	3916.8	9851	1970.2	3940.4
9616	1923.2	3846.4	9675	1935	3870	9734	1946.8	3893.6	9793	1958.6	3917.2	9852	1970.4	3940.8
9617	1923.4	3846.8	9676	1935.2	3870.4	9735	1947	3894	9794	1958.8	3917.6	9853	1970.6	3941.2
9618	1923.6	3847.2	9677	1935.4	3870.8	9736	1947.2	3894.4	9795	1959	3918	9854	1970.8	3941.6
9619	1923.8	3847.6	9678	1935.6	3871.2	9737	1947.4	3894.8	9796	1959.2	3918.4	9855	1971	3942
9620	1924	3848	9679	1935.8	3871.6	9738	1947.6	3895.2	9797	1959.4	3918.8	9856	1971.2	3942.4
9621	1924.2	3848.4	9680	1936	3872	9739	1947.8	3895.6	9798	1959.6	3919.2	9857	1971.4	3942.8
9622	1924.4	3848.8	9681	1936.2	3872.4	9740	1948	3896	9799	1959.8	3919.6	9858	1971.6	3943.2
9623	1924.6	3849.2	9682	1936.4	3872.8	9741	1948.2	3896.4	9800	1960	3920	9859	1971.8	3943.6
9624	1924.8	3849.6	9683	1936.6	3873.2	9742	1948.4	3896.8	9801	1960.2	3920.4	9860	1972	3944
9625	1925	3850	9684	1936.8	3873.6	9743	1948.6	3897.2	9802	1960.4	3920.8	9861	1972.2	3944.4
9626	1925.2	3850.4	9685	1937	3874	9744	1948.8	3897.6	9803	1960.6	3921.2	9862	1972.4	3944.8
9627	1925.4	3850.8	9686	1937.2	3874.4	9745	1949	3898	9804	1960.8	3921.6	9863	1972.6	3945.2
9628	1925.6	3851.2	9687	1937.4	3874.8	9746	1949.2	3898.4	9805	1961	3922	9864	1972.8	3945.6
9629	1925.8	3851.6	9688	1937.6	3875.2	9747	1949.4	3898.8	9806	1961.2	3922.4	9865	1973	3946
9630	1926	3852	9689	1937.8	3875.6	9748	1949.6	3899.2	9807	1961.4	3922.8	9866	1973.2	3946.4
9631	1926.2	3852.4	9690	1938	3876	9749	1949.8	3899.6	9808	1961.6	3923.2	9867	1973.4	3946.8
9632	1926.4	3852.8	9691	1938.2	3876.4	9750	1950	3900	9809	1961.8	3923.6	9868	1973.6	3947.2
9633	1926.6	3853.2	9692	1938.4	3876.8	9751	1950.2	3900.4	9810	1962	3924	9869	1973.8	3947.6
9634	1926.8	3853.6	9693	1938.6	3877.2	9752	1950.4	3900.8	9811	1962.2	3924.4	9870	1974	3948
9635	1927	3854	9694	1938.8	3877.6	9753	1950.6	3901.2	9812	1962.4	3924.8	9871	1974.2	3948.4
9636	1927.2	3854.4	9695	1939	3878	9754	1950.8	3901.6	9813	1962.6	3925.2	9872	1974.4	3948.8
9637	1927.4	3854.8	9696	1939.2	3878.4	9755	1951	3902	9814	1962.8	3925.6	9873	1974.6	3949.2
9638	1927.6	3855.2	9697	1939.4	3878.8	9756	1951.2	3902.4	9815	1963	3926	9874	1974.8	3949.6
9639	1927.8	3855.6	9698	1939.6	3879.2	9757	1951.4	3902.8	9816	1963.2	3926.4	9875	1975	3950
9640	1928	3856	9699	1939.8	3879.6	9758	1951.6	3903.2	9817	1963.4	3926.8	9876	1975.2	3950.4
9641	1928.2	3856.4	9700	1940	3880	9759	1951.8	3903.6	9818	1963.6	3927.2	9877	1975.4	3950.8
9642	1928.4	3856.8	9701	1940.2	3880.4	9760	1952	3904	9819	1963.8	3927.6	9878	1975.6	3951.2
9643	1928.6	3857.2	9702	1940.4	3880.8	9761	1952.2	3904.4	9820	1964	3928	9879	1975.8	3951.6
9644	1928.8	3857.6	9703	1940.6	3881.2	9762	1952.4	3904.8	9821	1964.2	3928.4	9880	1976	3952
9645	1929	3858	9704	1940.8	3881.6	9763	1952.6	3905.2	9822	1964.4	3928.8	9881	1976.2	3952.4
9646	1929.2	3858.4	9705	1941	3882	9764	1952.8	3905.6	9823	1964.6	3929.2	9882	1976.4	3952.8
9647	1929.4	3858.8	9706	1941.2	3882.4	9765	1953	3906	9824	1964.8	3929.6	9883	1976.6	3953.2
9648	1929.6	3859.2	9707	1941.4	3882.8	9766	1953.2	3906.4	9825	1965	3930	9884	1976.8	3953.6
9649	1929.8	3859.6	9708	1941.6	3883.2	9767	1953.4	3906.8	9826	1965.2	3930.4	9885	1977	3954
9650	1930	3860	9709	1941.8	3883.6	9768	1953.6	3907.2	9827	1965.4	3930.8	9886	1977.2	3954.4
9651	1930.2	3860.4	9710	1942	3884	9769	1953.8	3907.6	9828	1965.6	3931.2	9887	1977.4	3954.8
9652	1930.4	3860.8	9711	1942.2	3884.4	9770	1954	3908	9829	1965.8	3931.6	9888	1977.6	3955.2
9653	1930.6	3861.2	9712	1942.4	3884.8	9771	1954.2	3908.4	9830	1966	3932			
9654	1930.8	3861.6	9713	1942.6	3885.2	9772	1954.4	3908.8	9831	1966.2	3932.4			
9655	1931	3862	9714	1942.8	3885.6	9773	1954.6	3909.2	9832	1966.4	3932.8			
9656	1931.2	3862.4	9715	1943	3886	9774	1954.8	3909.6	9833	1966.6	3933.2			
9657	1931.4	3862.8	9716	1943.2	3886.4	9775	1955	3910	9834	1966.8	3933.6			
9658	1931.6	3863.2	9717	1943.4	3886.8	9776	1955.2	3910.4	9835	1967	3934			
9659	1931.8	3863.6	9718	1943.6	3887.2	9777	1955.4	3910.8	9836	1967.2	3934.4			
9660	1932	3864	9719	1943.8	3887.6	9778	1955.6	3911.2	9837	1967.4	3934.8			
9661	1932.2	3864.4	9720	1944	3888	9779	1955.8	3911.6	9838	1967.6	3935.2			
9662	1932.4	3864.8	9721	1944.2	3888.4	9780	1956	3912	9839	1967.8	3935.6			
9663	1932.6	3865.2	9722	1944.4	3888.8	9781	1956.2	3912.4	9840	1968	3936			
9664	1932.8	3865.6	9723	1944.6	3889.2	9782	1956.4	3912.8	9841	1968.2	3936.4			
9665	1933	3866	9724	1944.8	3889.6	9783	1956.6	3913.2	9842	1968.4	3936.8			
9666	1933.2	3866.4	9725	1945	3890	9784	1956.8	3913.6	9843	1968.6	3937.2			
9667	1933.4	3866.8	9726	1945.2	3890.4	9785	1957	3914	9844	1968.8	3937.6			
9668	1933.6	3867.2	9727	1945.4	3890.8	9786	1957.2	3914.4	9845	1969	3938			
9669	1933.8	3867.6	9728	1945.6	3891.2	9787	1957.4	3914.8	9846	1969.2	3938.4			
9670	1934	3868	9729	1945.8	3891.6	9788	1957.6	3915.2	9847	1969.4	3938.8			

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9 — Schematics

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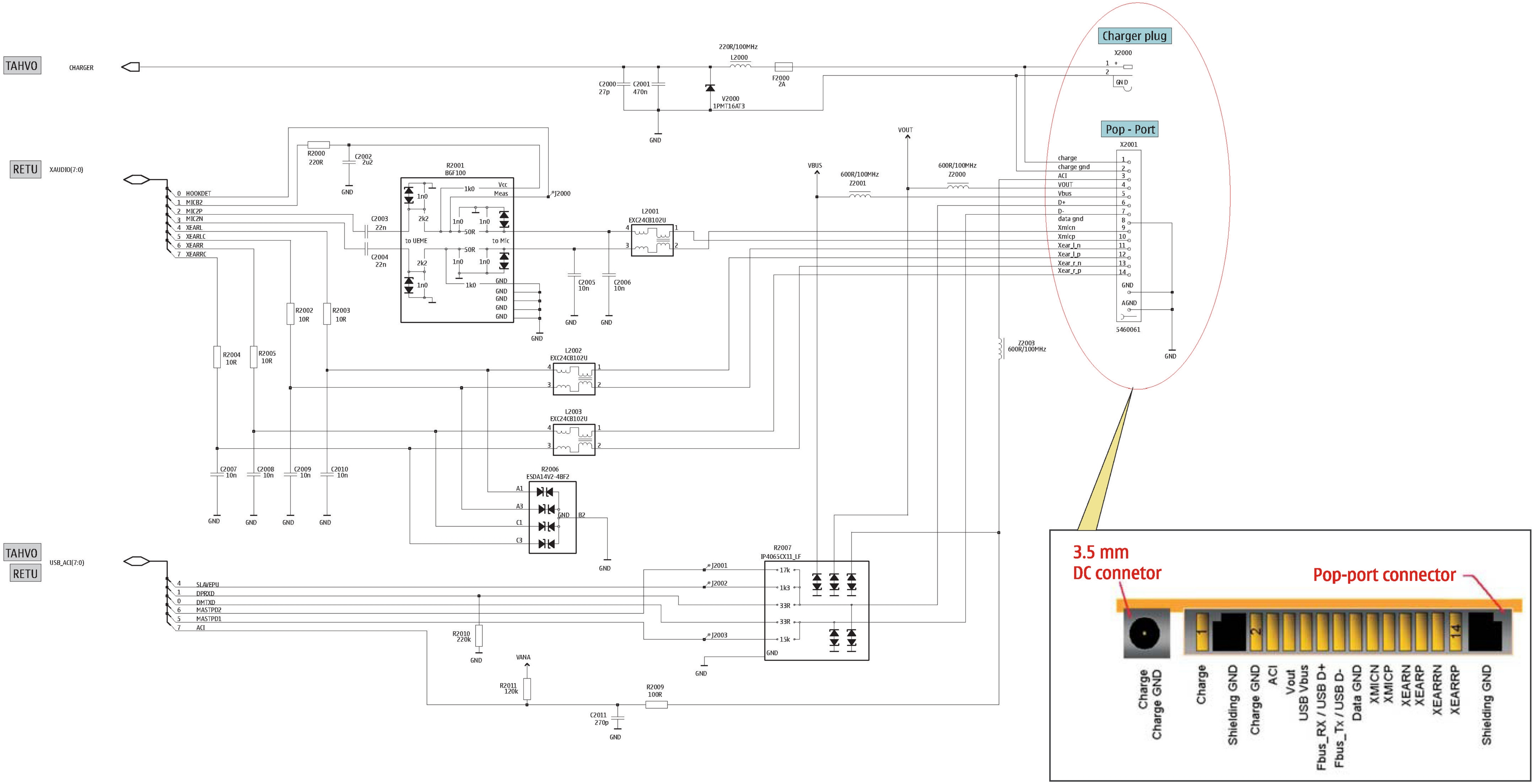
System connector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220R/100MHz
L2000
F2000
2A
C2000
27p
C2001
470n
V2000
1PMT16AT3
GND
Charger plug
X2000
1
2
GND
RETU
XAUDIO(7:0)
0 HOOKDET
1 MICB2
2 MICP2
3 MIC2N
4 XEARL
5 XEARLC
6 XEARR
7 XEARRC
R2000
220R
C2002
2u2
R2001
BGF100
Vcc
Meas
J2000
1k0
1n0
2k2
50R
to UEME
to Mic
C2003
22n
C2004
22n
L2001
EXC24CB102U
C2005
10n
C2006
10n
VBUS
VOUT
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Z2001
600R/100MHz
Z2000
Pop - Port
X2001
charge
charge gnd
ACI
VOUT
Vbus
D+
D-
data gnd
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Xmicp
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Xear_r_n
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AGND
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R2003
10R
R2004
10R
R2005
10R
L2002
EXC24CB102U
L2003
EXC24CB102U
C2007
10n
C2008
10n
C2009
10n
C2010
10n
R2006
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A3
C1
C3
B2
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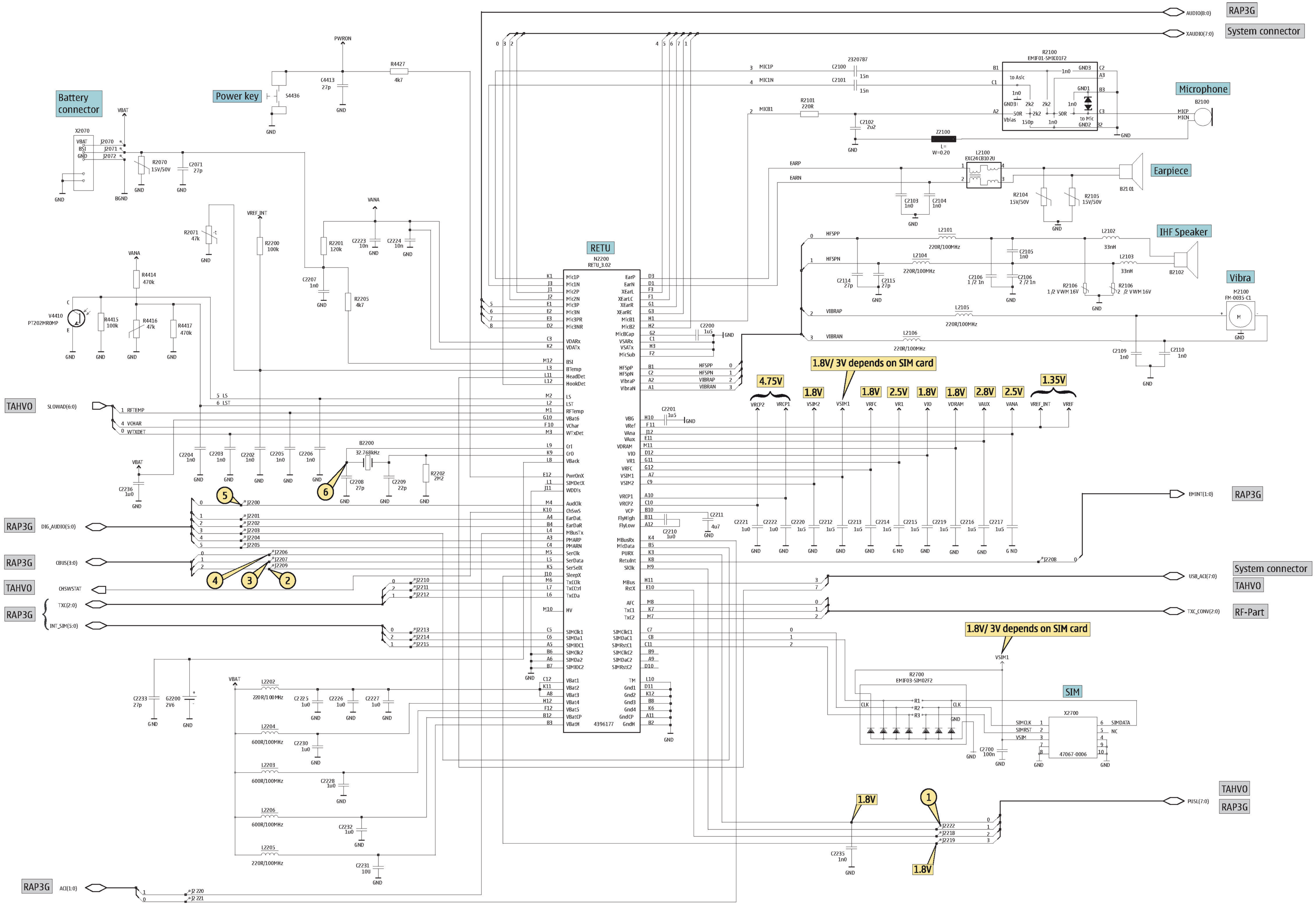
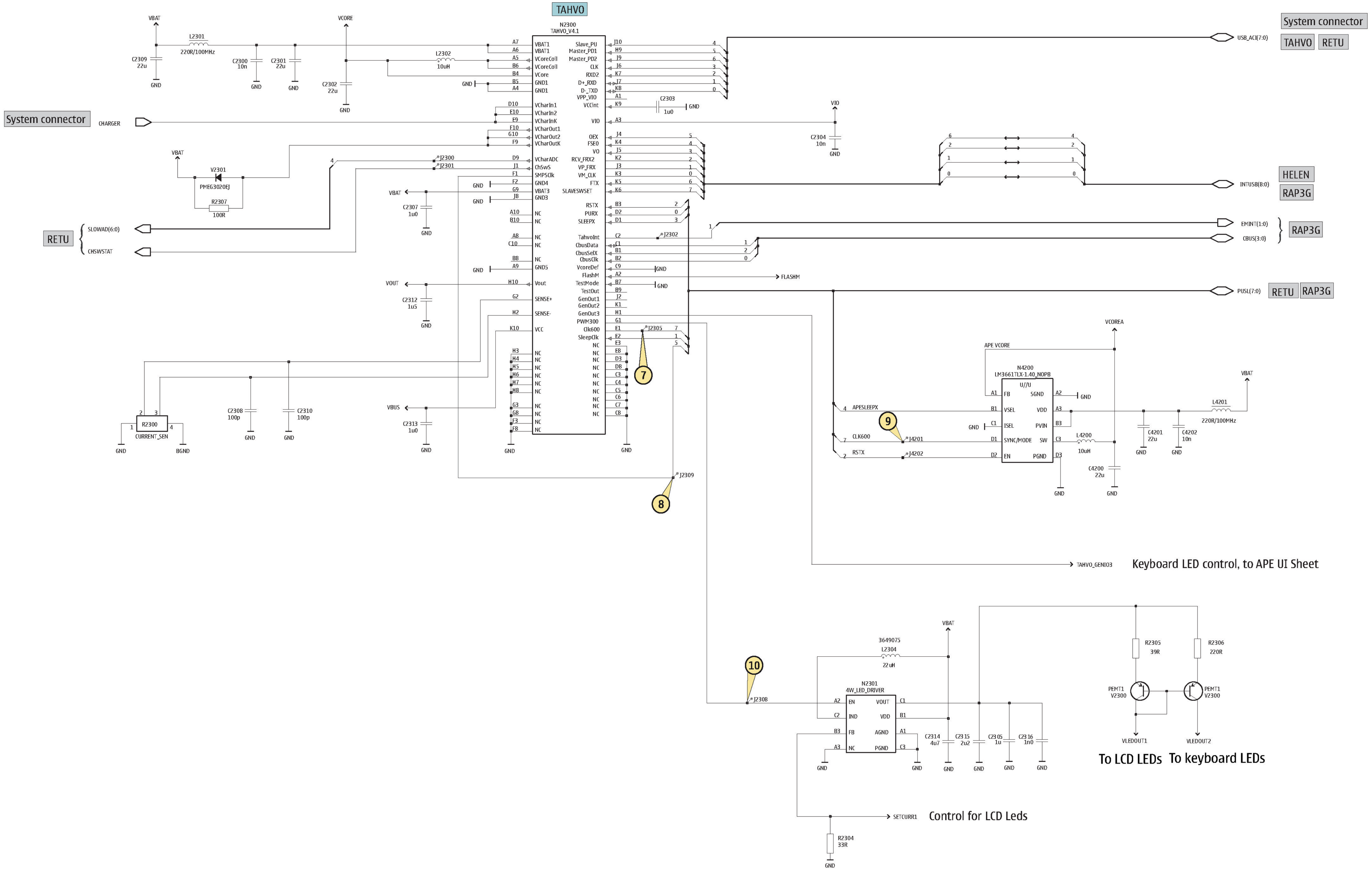
0 DMTXD
6 MASTPD2
5 MASTPD1
7 ACI
J2001
J2002
J2003
R2007
IP4065CX11_LF
17k
1k3
33R
33R
15k
R2010
220k
VANA
R2011
120k
R2009
100R
C2011
270p
3.5 mm
DC connetor
Pop-port connector
Charge
Charge GND
Charge
Shielding GND
Charge GND
ACI
Vout
USB Vbus
Fbus_RX / USB D+
Fbus_Tx / USB D-
Data GND
XMICN
XMICP
XEARN
XEARP
XEARRN
XEARRP
Shielding GND
1
2
14

RETU


RAP3G
AUDIO(8:0)
System connector
XAUDIO(7:0)
Battery connector
X2070
Power key
S4436
PWRON
R4427 4k7
C4413 27p
R2100 EMIF01-SMIC01F2
Microphone
B2100
Z2100
Earpiece
L2100 EXC24CB102U
B2101
IHF Speaker
B2102
Vibra
M2100 FM-0035-C1
RETU
N2200 RETU_3.02
4396177
B2200 32.768kHz
1.8V/ 3V depends on SIM card
4.75V
1.8V
2.5V
1.35V
VRCP2
VRCP1
VSIM2
VSIM1
VRFC
VR1
VIO
VDRAM
VAUX
VANA
VREF_INT
VREF
TAHVO
SLOWAD(6:0)
RFTEMP
VCHAR
WTXDET
DIG_AUDIO(5:0)
CBUS(3:0)
CHSWSTAT
TXC(2:0)
INT_SIM(5:0)
ACI(1:0)
EMINT(1:0)
USB_ACI(7:0)
TXC_CONV(2:0)
RF-Part
SIM
R2700 EMIF03-SIM02F2
X2700
47067-0006
PUSL(7:0)
1
2
3
4
5
6

TAHVO

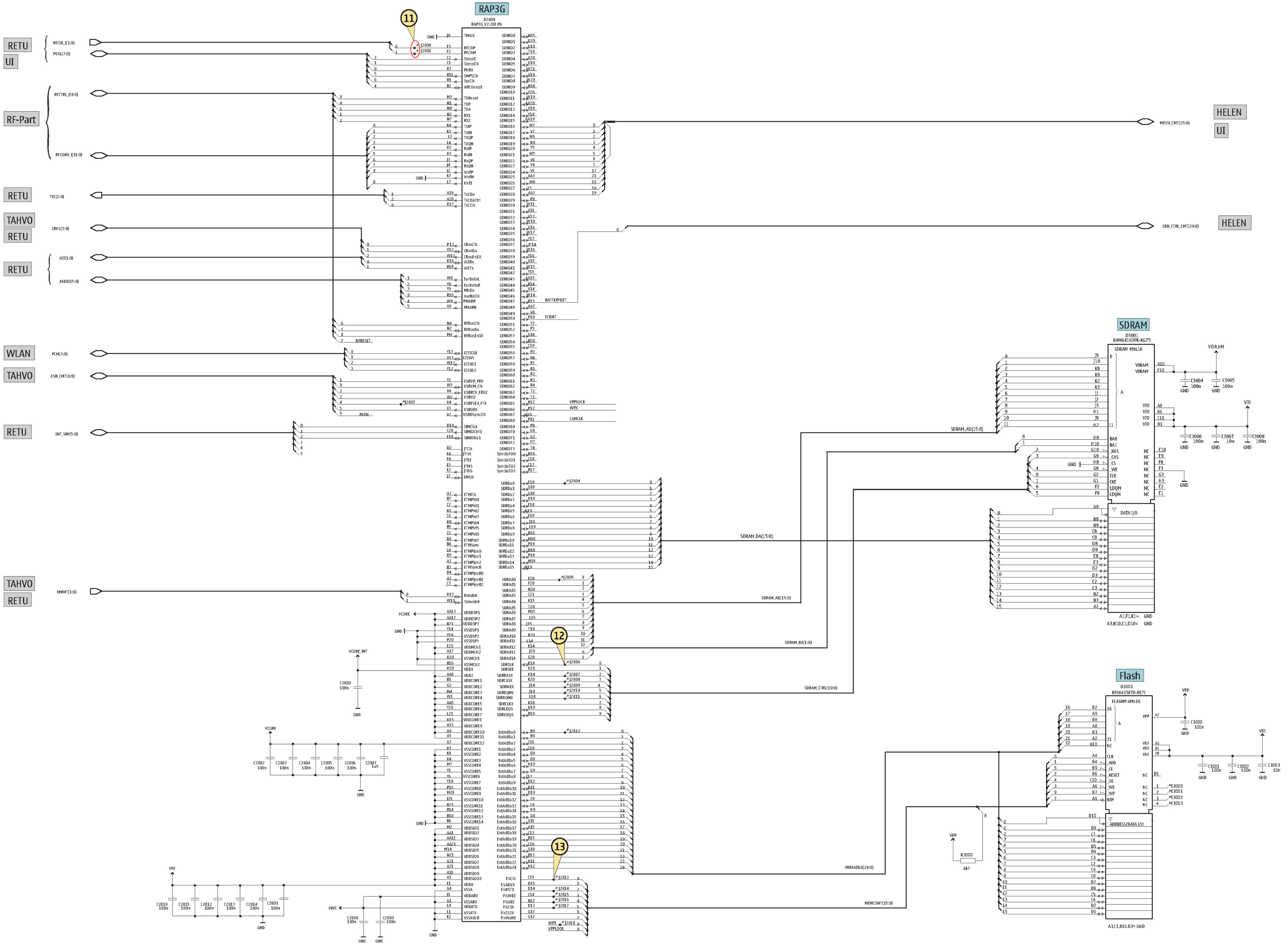

TAHVO
N2300
TAHVO_V4.1
System connector
TAHVO
RETU
System connector
CHARGER
VBAT
VCORE
L2301
220R/100MHz
C2309
22u
C2300
10n
C2301
22u
C2302
22u
L2302
10uH
GND
V2301
PMEG3020EJ
R2307
100R
RETU
SLOWAD(6:0)
CHSWSTAT
VBAT3
C2307
1u0
VOUT
C2312
1u5
VBUS
C2313
1u0
R2300
CURRENT_SEN
BGND
C2308
100p
C2310
100p
J2300
J2301
J2302
J2305
J2309
C2303
1u0
VIO
C2304
10n
USB_ACI(7:0)
HELEN
RAP3G
INTUSB(8:0)
EMINT(1:0)
CBUS(3:0)
RAP3G
FLASHM
PUSL(7:0)
RETU
RAP3G
7
8
9
10
VCOREA
APE VCORE
N4200
LM3661TLX-1.40_NOPB
APESLEEPX
CLK600
RSTX
J4201
J4202
L4200
10uH
C4200
22u
L4201
220R/100MHz
C4201
22u
C4202
10n
TAHVO_GENIO3
3649075
L2304
22uH
N2301
4W_LED_DRIVER
J2308
C2314
4u7
C2315
2u2
C2305
1u
C2316
1n0
R2305
39R
R2306
220R
PEMT1
V2300
VLEDOUT1
VLEDOUT2
SETCURR1
R2304
33R

Keyboard LED control, to APE UI Sheet

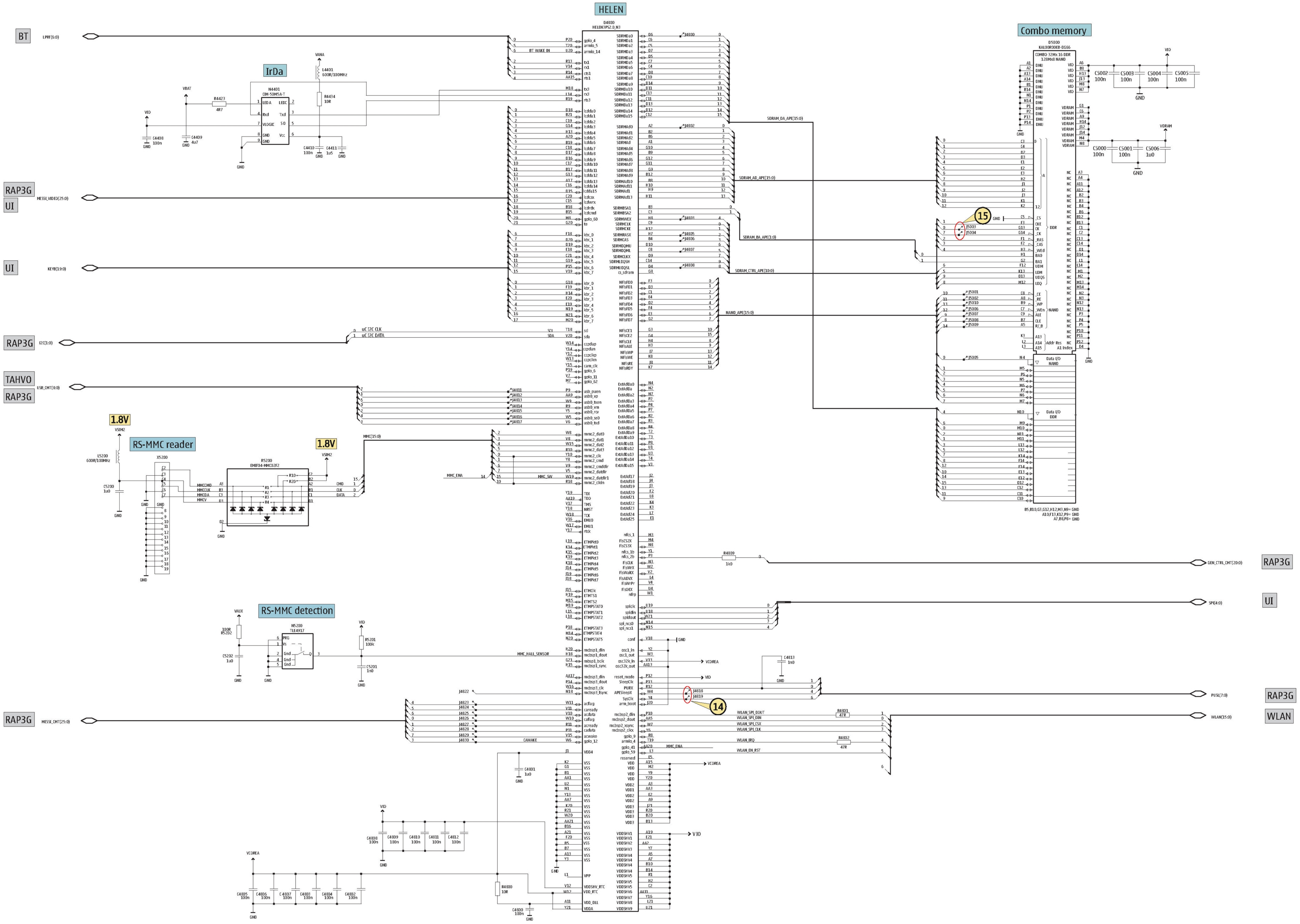
To LCD LEDs To keyboard LEDs

Control for LCD Leds

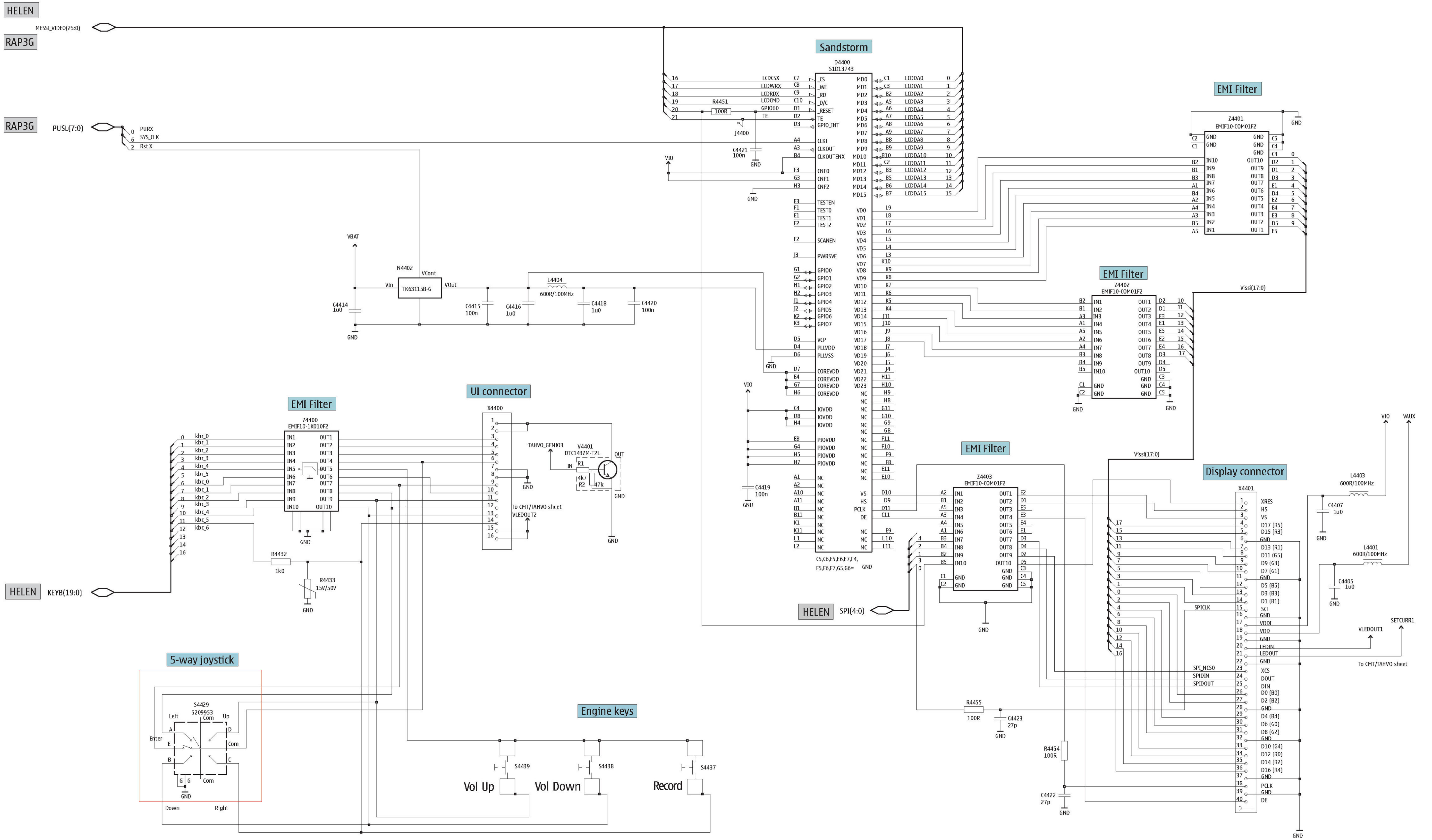
RAP3G, memories


RAP3G
D2800
RETU
UI
RF-Part
RETU
TAHVO
RETU
RETU
WLAN
TAHVO
RETU
TAHVO
RETU
HELEN
UI
HELEN
SDRAM
D3001
Flash
D3000
11
12
13
VCORE
VIO
VPP
VDRAM
GND
SDRAM_DA(15:0)
SDRAM_AD(15:0)
SDRAM_BA(1:0)
SDRAM_CTRL(10:0)
MEMADDA(24:0)
MEMCONT(15:0)
MESSI_CMT(25:0)
GEN_CTRL_CMT(20:0)
DATA I/O
ADDRESS/DATA I/O

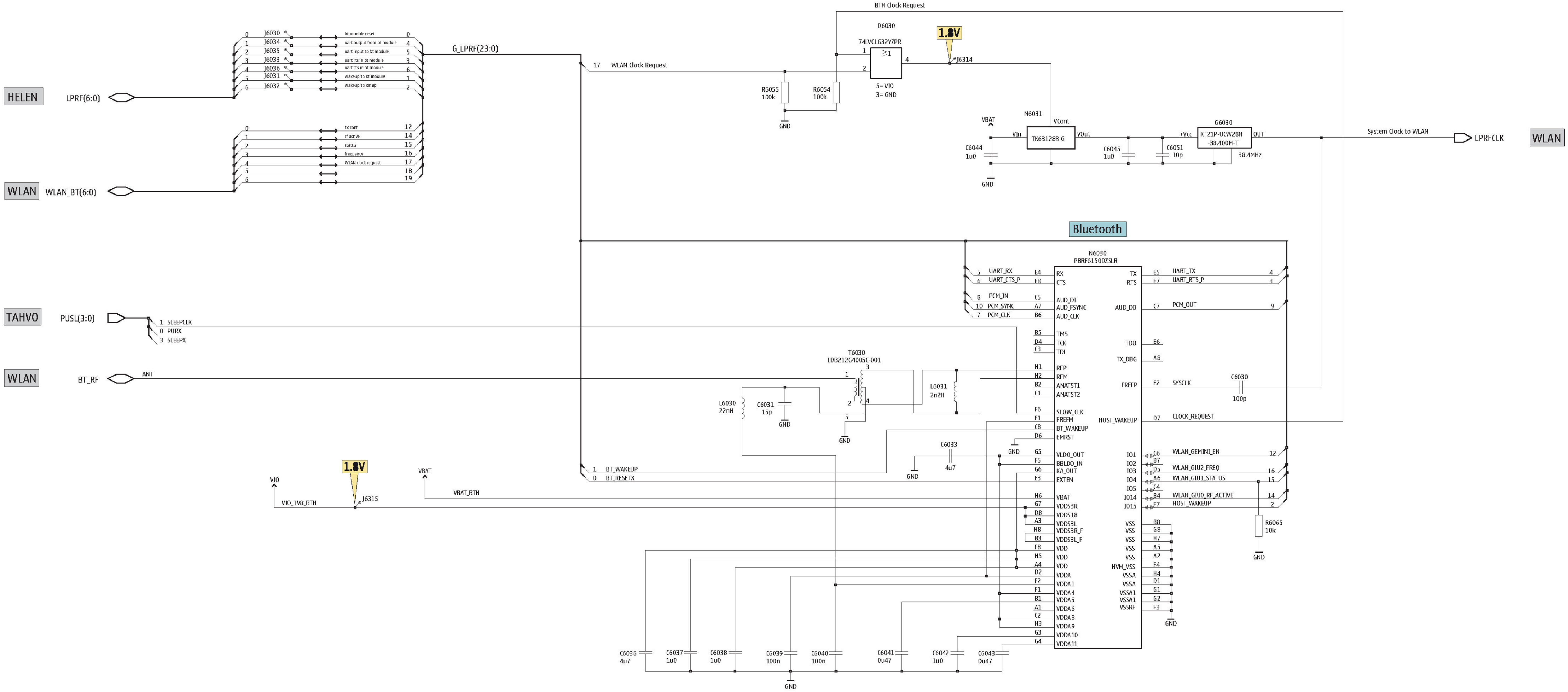
Helen, MMC, combo memory


HELEN
Combo memory
IrDa
BT
RAP3G
UI
RAP3G
RAP3G
TAHVO
RAP3G
1.8V
RS-MMC reader
1.8V
RS-MMC detection
RAP3G
RAP3G
UI
RAP3G
WLAN
RAP3G
15
14

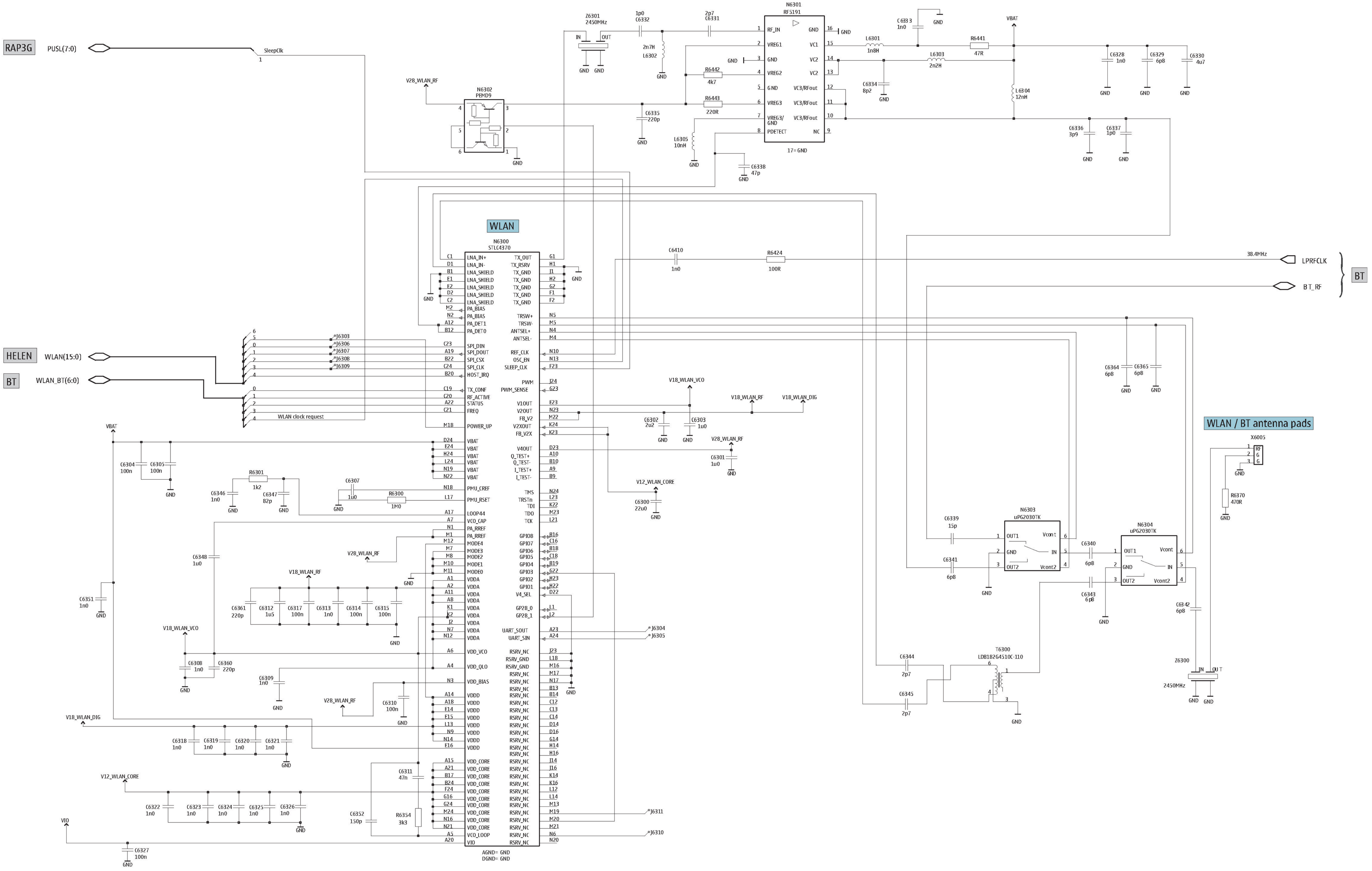
UI


HELEN
RAP3G
MESSI_VIDEO(25:0)
RAP3G
PUSL(7:0)
PURX
SYS_CLK
Rst X
Sandstorm
D4400
S1D13743
LCDCSX
LCDWRX
LCDRDX
LCDCMD
GPIO60
TE
R4451
100R
J4400
C4421
100n
VIO
GND
EMI Filter
Z4401
EMIF10-COM01F2
EMI Filter
Z4402
EMIF10-COM01F2
Vissi(17:0)
VBAT
N4402
TK63115B-6
VIn
VCont
VOut
C4414
1u0
C4415
100n
C4416
1u0
L4404
600R/100MHz
C4418
1u0
C4420
100n
EMI Filter
Z4400
EMIF10-1K010F2
kbr_0
kbr_1
kbr_2
kbr_3
kbr_4
kbr_5
kbc_0
kbc_1
kbc_2
kbc_3
kbc_4
kbc_5
kbc_6
UI connector
X4400
TAHVO_GENIO3
V4401
DTC143ZM-T2L
IN
OUT
R1
R2
4k7
47k
To CMT/TAHVO sheet
VLEDOUT2
HELEN
KEYB(19:0)
R4432
1k0
R4433
15V/50V
C4419
100n
EMI Filter
Z4403
EMIF10-COM01F2
HELEN
SPI(4:0)
Vissi(17:0)
Display connector
X4401
XRES
HS
VS
SPICLK
SPI_NCS0
SPIDIN
SPIDOUT
VIO
VAUX
L4403
600R/100MHz
C4407
1u0
L4401
600R/100MHz
C4405
1u0
VLEDOUT1
SETCURR1
To CMT/TAHVO sheet
R4455
100R
C4423
27p
R4454
100R
C4422
27p
5-way joystick
S4429
S209953
Left
Up
Com
Enter
Down
Right
Engine keys
S4439
S4438
S4437
Vol Up
Vol Down
Record

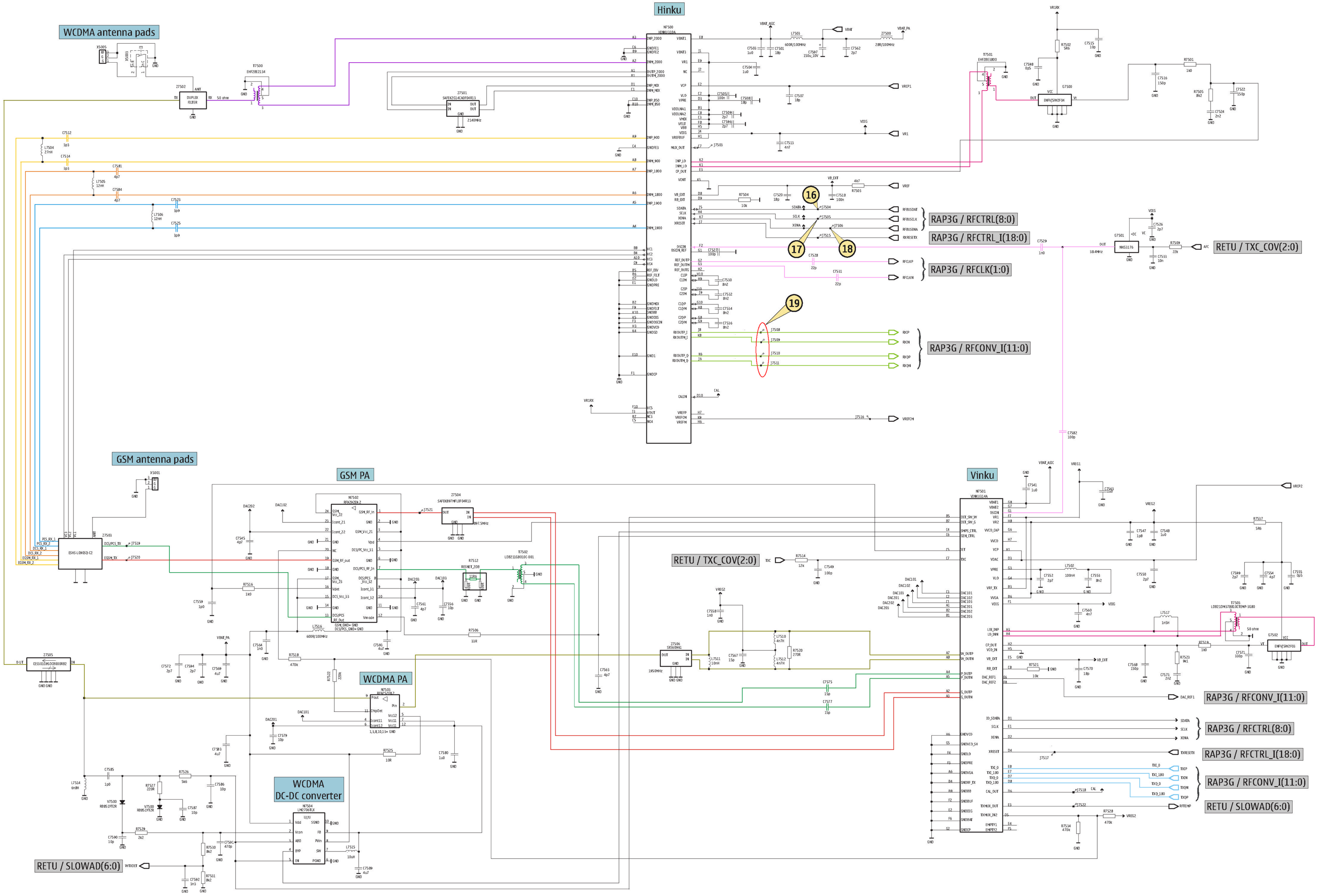
Bluetooth


HELEN
LPRF(6:0)
WLAN
WLAN_BT(6:0)
J6030
J6034
J6035
J6033
J6036
J6031
J6032
bt module reset
uart output from bt module
uart input to bt module
uart rts in bt module
uart cts in bt module
wakeup to bt module
wakeup to omap
tx conf
rf active
status
frequency
WLAN clock request
G_LPRF(23:0)
17 WLAN Clock Request
BTH Clock Request
D6030
74LVC1G32YZPR
≥1
5= VIO
3= GND
1.8V
J6314
R6055
100k
R6054
100k
GND
N6031
TK63128B-G
VBAT
VIn
VCont
VOut
C6044
1u0
C6045
1u0
C6051
10p
G6030
KT21P-UCW28N
-38.400M-T
+Vcc
OUT
38.4MHz
System Clock to WLAN
LPRFCLK
WLAN
Bluetooth
N6030
PBRF6150DZSLR
5 UART_RX E4 RX
6 UART_CTS_P E8 CTS
8 PCM_IN C5 AUD_DI
10 PCM_SYNC A7 AUD_FSYNC
7 PCM_CLK B6 AUD_CLK
B5 TMS
D4 TCK
C3 TDI
H1 RFP
H2 RFM
B2 ANATST1
C1 ANATST2
F6 SLOW_CLK
E1 FREFM
C8 BT_WAKEUP
D6 EMRST
G5 VLDO_OUT
F5 BBLDO_IN
G6 KA_OUT
E3 EXTEN
H6 VBAT
G7 VDDS3R
D8 VDDS18
A3 VDDS3L
H8 VDDS3R_F
B3 VDDS3L_F
F8 VDD
H5 VDD
A4 VDD
D2 VDDA
F2 VDDA1
F1 VDDA4
B1 VDDA5
A1 VDDA6
C2 VDDA8
H3 VDDA9
G3 VDDA10
G4 VDDA11
TX E5 UART_TX 4
RTS E7 UART_RTS_P 3
AUD_DO C7 PCM_OUT 9
TDO E6
TX_DBG A8
FREFP E2 SYSCLK
C6030
100p
HOST_WAKEUP D7 CLOCK_REQUEST
IO1 C6 WLAN_GEMINI_EN 12
IO2 B7
IO3 D5 WLAN_GIU2_FREQ 16
IO4 A6 WLAN_GIU1_STATUS 15
IO5 C4
IO14 B4 WLAN_GIU0_RF_ACTIVE 14
IO15 F7 HOST_WAKEUP 2
VSS B8
VSS G8
VSS H7
VSS A5
VSS A2
HVM_VSS F4
VSSA H4
VSSA D1
VSSA1 G1
VSSA1 G2
VSSRF F3
R6065
10k
TAHVO
PUSL(3:0)
1 SLEEPCLK
0 PURX
3 SLEEPX
WLAN
BT_RF
ANT
T6030
LDB212G4005C-001
L6030
22nH
C6031
15p
L6031
2n2H
C6033
4u7
1 BT_WAKEUP
0 BT_RESETX
VIO
VIO_1V8_BTH
1.8V
J6315
VBAT
VBAT_BTH
C6036
4u7
C6037
1u0
C6038
1u0
C6039
100n
C6040
100n
C6041
0u47
C6042
1u0
C6043
0u47

WLAN

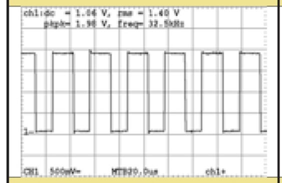

RAP3G
PUSL(7:0)
SleepClk
HELEN
WLAN(15:0)
BT
WLAN_BT(6:0)
WLAN clock request
WLAN
N6300
STLC4370
N6301
RF3191
N6302
PEMD9
Z6301
2450MHz
C6332
1p0
C6331
2p7
L6302
2n7H
R6442
4k7
R6443
220R
C6335
220p
L6305
10nH
C6338
47p
C6333
1n0
L6301
1n8H
L6303
2n2H
R6441
47R
C6334
8p2
L6304
12nH
VBAT
C6328
1n0
C6329
6p8
C6330
4u7
C6336
3p9
C6337
1p0
C6410
1n0
R6424
100R
38.4MHz
LPRFCLK
BT_RF
BT
C6364
6p8
C6365
6p8
V18_WLAN_VCO
V18_WLAN_RF
V18_WLAN_DIG
C6302
2u2
C6303
1u0
V28_WLAN_RF
C6301
1u0
V12_WLAN_CORE
C6300
22u0
WLAN / BT antenna pads
X6005
R6370
470R
N6303
uPG2030TK
N6304
uPG2030TK
C6339
15p
C6341
6p8
C6340
6p8
C6343
6p8
C6342
6p8
T6300
LDB182G4510C-110
C6344
2p7
C6345
2p7
Z6300
2450MHz
C6304
100n
C6305
100n
R6301
1k2
C6346
1n0
C6347
82p
C6307
1u0
R6300
1M0
C6348
1u0
C6351
1n0
C6361
220p
C6312
1u5
C6317
100n
C6313
1n0
C6314
100n
C6315
100n
C6308
1n0
C6360
220p
C6309
1n0
C6310
100n
C6311
47n
C6318
1n0
C6319
1n0
C6320
1n0
C6321
1n0
C6322
1n0
C6323
1n0
C6324
1n0
C6325
1n0
C6326
1n0
C6352
150p
R6354
3k3
C6327
100n
VIO
J6303
J6306
J6307
J6308
J6309
J6304
J6305
J6311
J6310
AGND= GND
DGND= GND
17= GND
GND

RF part

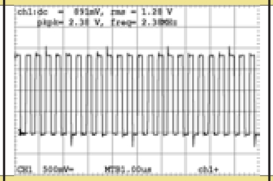

WCDMA antenna pads
Hinku
GSM antenna pads
GSM PA
WCDMA PA
WCDMA
DC-DC converter
Vinku
RAP3G / RFCTRL(8:0)
RAP3G / RFCTRL_I(18:0)
RETU / TXC_COV(2:0)
RAP3G / RFCLK(1:0)
RAP3G / RFCONV_I(11:0)
RETU / TXC_COV(2:0)
RAP3G / RFCONV_I(11:0)
RAP3G / RFCTRL(8:0)
RAP3G / RFCTRL_I(18:0)
RAP3G / RFCONV_I(11:0)
RETU / SLOWAD(6:0)
RETU / SLOWAD(6:0)
16
17
18
19

Signal overview

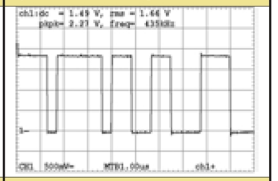
1) SleepCLK at J2222



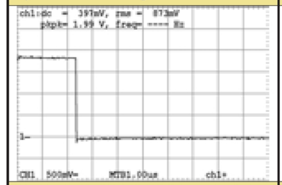
2) SerialCLK at J2206



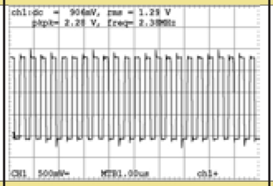
3) SerialDATA at J2207



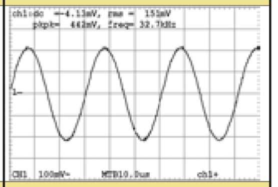
4) SerialSelX at J2209



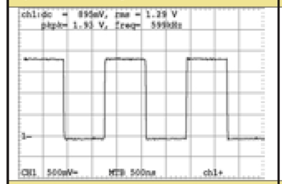
5) AudioCLK at J2200



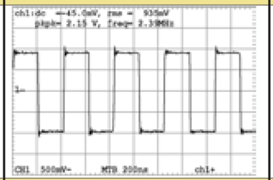
6) 32.768kHz at J2208



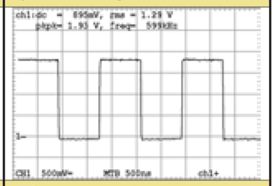
7) CLK600 at J2305



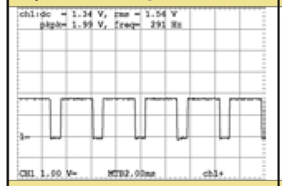
8) SMPSCLK at J2309



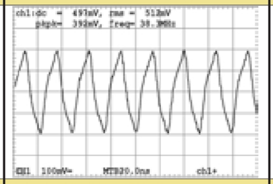
9) CLK600 at J4201



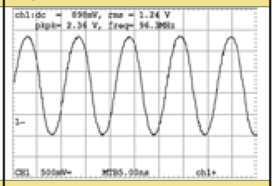
10) PWM300 at J2308



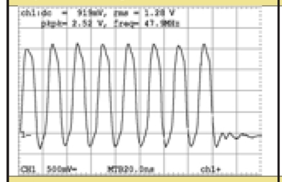
11) RFCLK at J2800 & J2801



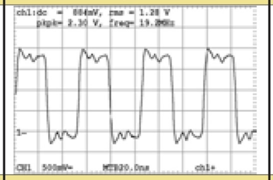
12) SDRCLK at J2806



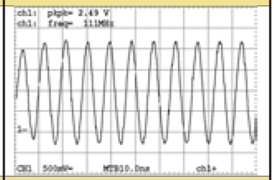
13) FlsCLK at J2813



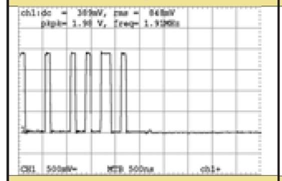
14) SYSCLK at J4819



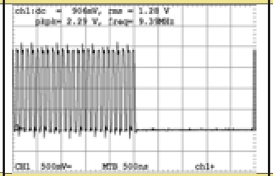
15) SDRAMCLK at J5003&J5004



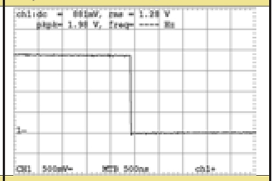
16) RFBUSDA at J7504



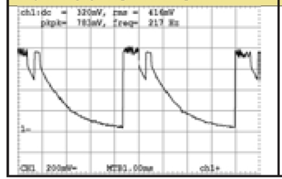
17) RFBUSCLK at J7505

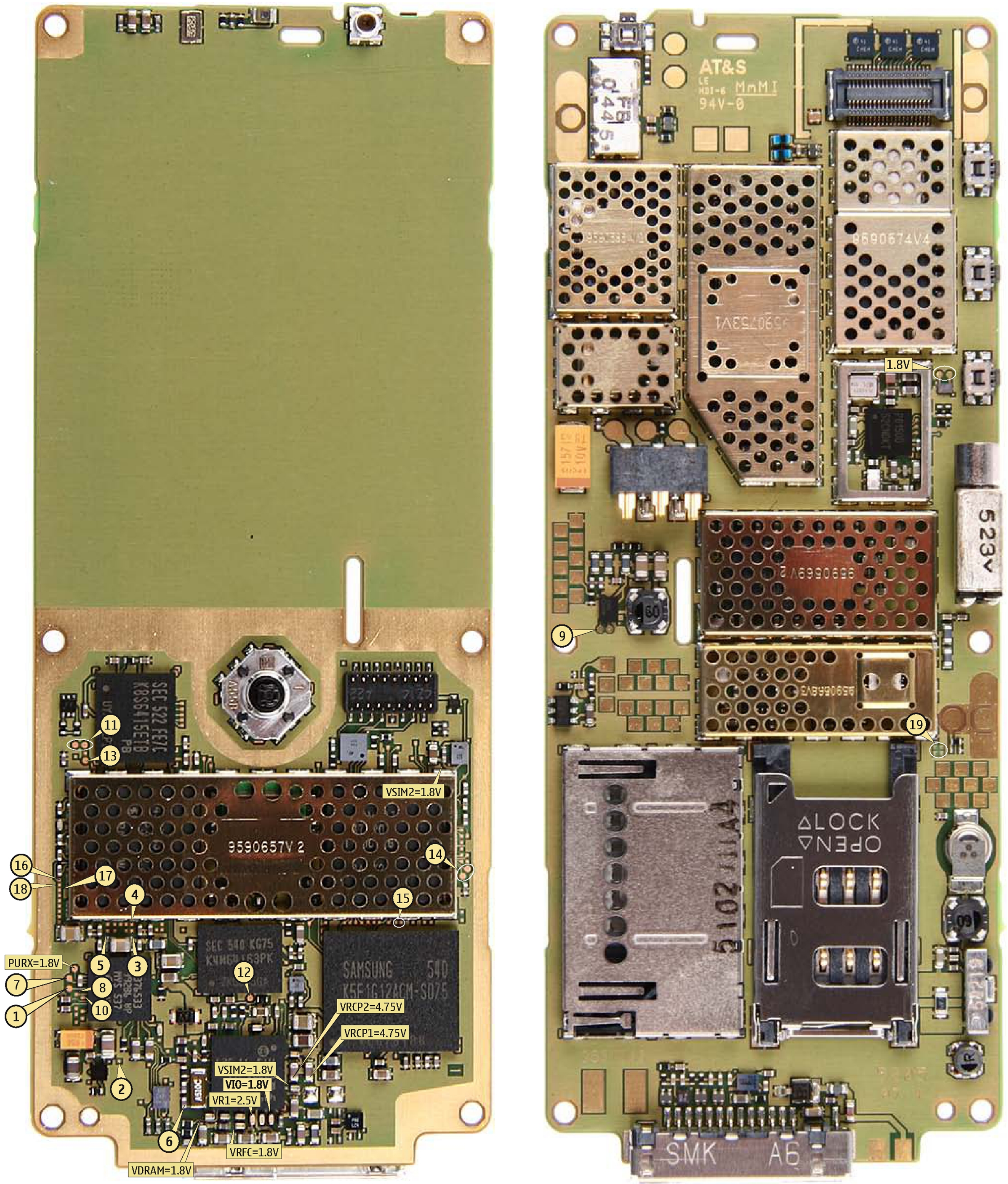


18) RFBUSENX at J7506



19) RX I/Q at J7508 - J7511





Component finder

B		C2313	T3	C5202	N8	C7505	F5	**D**		J3103	01	J6032	08	L7512	H6	R5100	L8	Z2003	V3
B2200	U4	C2314	U1	C6030	I3	C7507	E6	D2800	Q3	J3104	02	J6033	I2	L7514	D8	R5200	09	Z4400	07
C		C2315	T2	C6031	J3	C7508	E6	D3000	N2	J3105	P1	J6034	H2	L7515	F8	R5201	N9	Z4401	A3
C2000	U4	C2316	U2	C6033	I3	C7509	D6	D3001	S4	J3106	P2	J6035	I2	L7516	G2	R5202	N8	Z4402	A2
C2001	V4	C2700	T5	C6036	I2	C7512	D3	D4400	P5	J3107	M7	J6036	09	L7517	H4	R6054	H2	Z4403	A3
C2002	U6	C2800	P4	C6037	I2	C7513	F5	D4800	Q7	J3108	M7	J6303	M6	**M**		R6055	H2	Z6300	M3
C2003	U5	C2801	P1	C6038	H3	C7514	D3	D5000	S7	J3109	M8	J6304	K3	M2100	K1	R6065	H1	Z6301	M6
C2004	U5	C2802	R3	C6039	I3	C7515	G5	D6030	H2	J3110	01	J6305	K2	**N**		R6300	L4	Z7500	G2
C2005	U6	C2803	R2	C6040	I3	C7516	G6	**F**		J3111	M7	J6306	Q9	N2200	U5	R6301	K4	Z7501	D6
C2006	U6	C2804	01	C6041	H3	C7518	D4	F2000	V3	J3112	M7	J6308	J4	N2300	S2	R6354	K6	Z7502	B8
C2007	U7	C2805	Q4	C6042	I3	C7520	D5	**G**		J3113	M8	J6309	J3	N2301	U2	R6370	01	Z7503	D3
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C2009	U6	C2807	P1	C6044	H2	C7523	C3	G6030	H3	J3115	R1	J6311	L4	N4401	S1	R6441	M5	Z7505	E9
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C2100	V6	C2811	Q1	C6301	K3	C7527	E6	**J**		J3119	P1	J7504	Q1	N6031	H3	R7502	G5		
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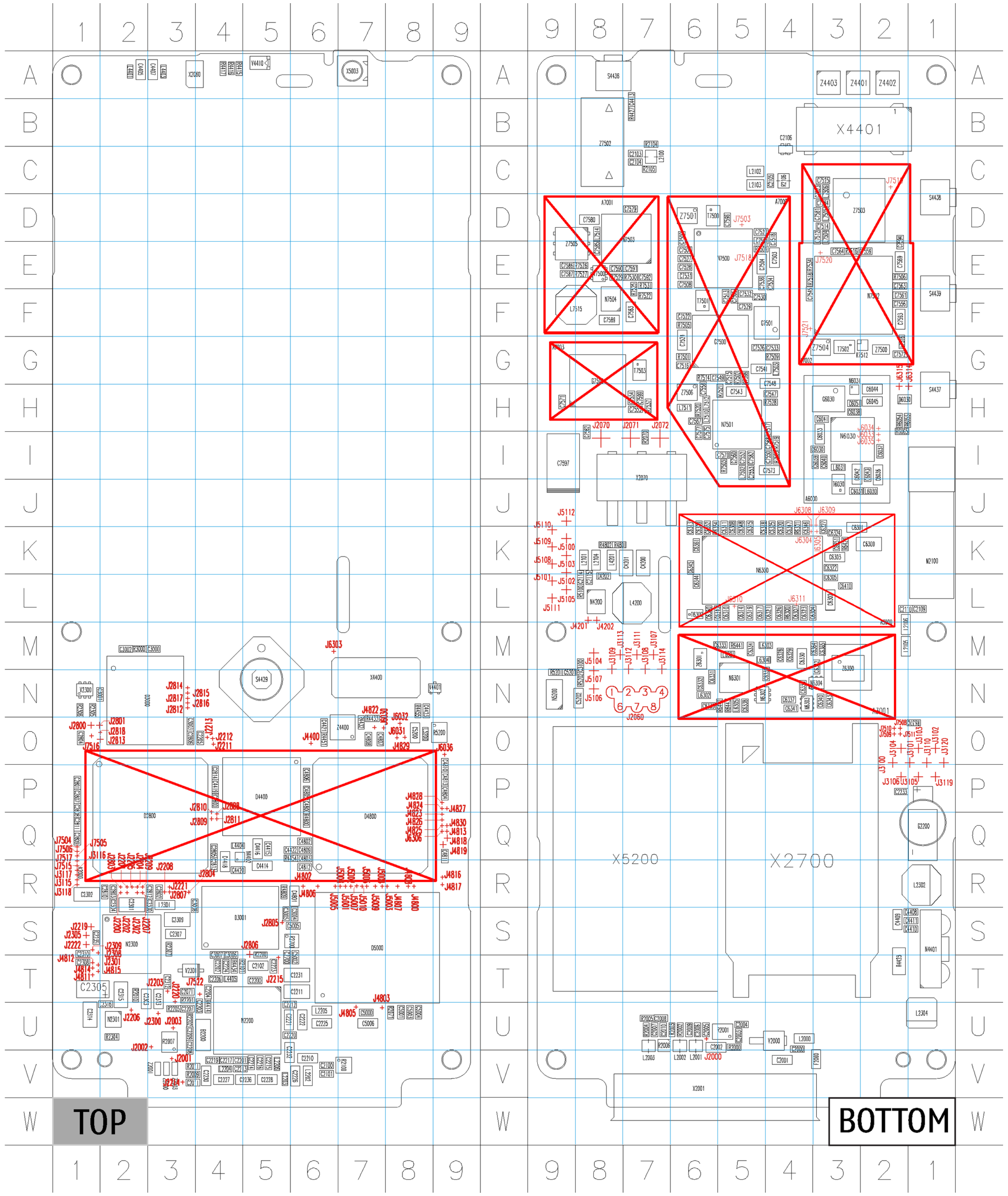

Glossary

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A/D-converter	Analog-to-digital converter
ACI	Accessory Control Interface
ADC	Analog-to-digital converter
ADSP	Application DPS (expected to run high level tasks)
AGC	Automatic gain control (maintains volume)
ALS	Ambient light sensor
AMSL	After Market Service Leader
ARM	Advanced RISC Machines
ARPU	Average revenue per user (per month or per year)
ASIC	Application Specific Integrated Circuit
ASIP	Application Specific Interface Protector
B2B	Board to board, connector between PWB and UI board
BB	Baseband
BC02	Bluetooth module made by CSR
BIQUAD	Bi-quadratic ,type of filter function)
BSI	Battery Size Indicator
BT	Bluetooth
CBus	MCU controlled serial bus connected to UPP_WD2,UEME and Zocus
CCP	Compact Camera Port
CDSP	Cellular DSP (expected to run at low levels)
CLDC	Connected limited device configuration
CMOS	Complimentary metal-oxide semiconductor circuit (low power consumption)
COF	Chip on Foil
COG	Chip on Glass
CPU	Central Processing Unit
CSR	cambridge silicon radio
CSTN	Color Super Twisted Nematic
CTSI	Clock Timing Sleep and interrupt block of Tiku
CW	Continuous wave
D/A-converter	Digital-to-analouge converter
DAC	Digital-to-analouge converter
DBI	Digital Battery Interface
DBus	DSP controlled serial bus connected between UPP_WD2 and Helgo
DCT-4	Digital Core Technology
DMA	Direct memory access
DP	Data Package

DPLL	Digital Phase Locked Loop
DSP	Digital Signal Processor
DtoS	Differential to Single ended
EDGE	Enhanced data rates for global/GSM evaluation
EGSM	Extended GSM
EM	Energy management
EMC	Electromagnetic compability
EMI	Electromagnetic interference
ESD	Electrostatic discharge
FCI	Functional cover interface
FPS	Flash Programming Tool
FR	Full rate
FSTN	Film compensated super twisted nematic
GND	Ground, conductive mass
GPIB	General-purpose interface bus
GPRS	General Packet Radio Service
GSM	Group Special Mobile/Global System for Mobile communication
HF	Hands free
HFCM	Handsfree Common
HS	Handset
HSCSD	High speed circuit switched data (data transmission connection faster than GSM)
HW	Hardware
I/O	Input/Output
IBAT	Battery current
IC	Integrated circuit
ICHAR	Charger current
IF	Interface
IHF	Integrated hands free
IMEI	International Mobile Equipment Identity
IR	Infrared
IrDA	Infrared Data Associasion
ISA	Intelligent software architecture
JPEG/JPG	Joint Photographic Experts Group
LCD	Liquid Crystal Display
LDO	Low Drop Out
LED	Light-emitting diode

LPRF	Low Power Radio Frequency
MCU	Micro Controller Unit (microprocessor)
MCU	Multiport control unit
MIC, mic	Microphone
MIDP	Mobile Information Device Profile
MIN	Mobile identification number
MIPS	Million instructions per second
MMC	Multimedia card
MMS	Multimedia messaging service
NTC	Negative temperature coefficient, temperature sensitive resistor used as a temperature sensor
OMA	Object management architechture
OMAP	Operations, maintenance, and administartion part
Opamp	Operational Amplifier
PA	Power amplifier
PDA	Pocket Data Application
PDA	Personal digital assistant
PDRAM	Program/Data RAM (on chip in Tiku)
Phoenix	Software tool of DCT4.x
PIM	Personal Information Management
PLL	Phase locked loop
PM	(Phone) Permanent memory
PUP	General Purpose IO (PIO), USARTS and Pulse Width Modulators
PURX	Power-up reset
PWB	Printed Wiring Board
PWM	Pulse width modulation
RC-filter	Resistance-Capacitance filter
RF	Radio Frequency
RF PopPort TM	Reduced function PopPortTM interface
RFBUS	Serial control Bus For RF
RSK	Right Soft Key
RS-MMC	Reduced size Multi Media Card
RSSI	Receiving signal strength indicator
RST	Reset Switch
RTC	Real Time Clock (provides date and time)
RX	Radio Receiver

SARAM	Single Access RAM
SAW filter	Surface Acoustic Wave filter
SDRAM	Synchronous Dynamic Random Access Memory
SID	Security ID
SIM	Subscriber Identity Module
SMPS	Switched Mode Power Supply
SNR	Signal-to-noice ratio
SPR	Standard Product requirements
SRAM	Static random access memory
STI	Serial Trace Interface
SW	Software
SWIM	Subscriber/Wallet Identification Module
TCXO	Temperature controlled Oscillator
Tiku	Finnish for Chip, Successor of the UPP, Official Tiku3G
TX	Radio Transmitter
UART	Universal asynchronous receiver/transmitter
UEME	Universal Energy Management chip (Enhanced version)
UEMEK	See UEME
UI	User Interface
UPP	Universal Phone Processor
UPP_WD2	Communicator version of DCT4 system ASIC
USB	Universal Serial Bus
VBAT	Battery voltage
VCHAR	Charger voltage
VCO	Voltage controlled oscillator
VCTCXO	Voltage Controlled Temperature Compensated Crystal Oscillator
VCXO	Voltage Controlled Crystal Oscillator
Vp-p	Peak-to-peak voltage
VSIM	SIM voltage
WAP	Wireless application protocol
WD	Watchdog
XHTML	Extensible hypertext markup language
Zocus	Current sensor, (used to monitor the current flow to and from the battery)